

Development of an Environmental Conscience: A Conservation History of Costa Rica

by Sterling Evans

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CONSCIENCE: A CONSERVATION
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BY S. EVANS

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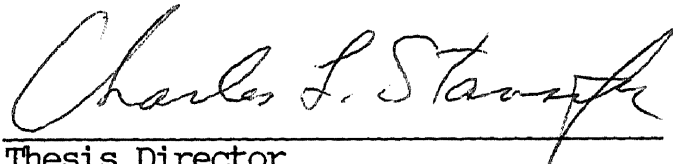
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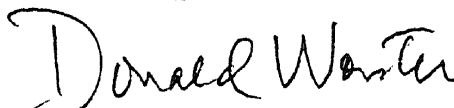
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ABSTRACT

Costa Rica proves to be an exemplary case study for the development of a national environmental conscience. This thesis examines what such a conscience entails, how it developed historically, how it was tested and challenged, and finally how it is manifested in society today. Conservation is the yardstick by which this environmental conscience can be measured in Costa Rica. Research for this paper concentrated specifically on land use patterns--from the beginnings of the agricultural era to the contemporary experience of protecting lands through national forests, parks, and biological reserves. The result is that fully one quarter of Costa Rican territory now is protected in one form or another. How this occurred against economic pressures to develop is analyzed herein. Likewise, that much of the history of these conservation successes occurred during a time of great economic crisis fueled both curiosity and interest in investigating this Costa Rican conservationist model. To accomplish this goal meant studying as much pertinent literature in the field as possible (especially the works written by those most personally involved in this area), meeting with some of these individuals to discuss their views, and visiting on site some of the agencies (both governmental and private) that play a role in Costa Rican conservation issues. The end product is this thesis which attempts to fuse these elements together to show the development of an environmental conscience through the country's history of conservation.

- Sterling Evans

Preface

Esta tierra pertenece a los costarricenses, algunos ya han muerto, otros todavía viven, pero la mayoría . . . aun no ha nacido.

- anonymous

(This land belongs to the Costa Ricans, some have already died, others are still living, but the majority . . . has not even been born.)*

The vision exemplified in the above anonymous saying makes Costa Rica an intriguing case study in environmental history. Its implied message, that Costa Rica is a country with a mind for the future--a future based on the environmental well-being of its land and inhabitants, begs the question of how such a conscience developed. More implicitly, to the student of history asking "what", "why", and "how much", this idea must be tested. First, to determine if indeed a national environmental conscience exists, and if so, then to trace its development, can be accomplished only in light of the successes and failures of the Costa Rican conservation experience. Thus tested, analysis can be focused on whether Costa Rica deserves its nicknames "the garden of the Americas" (Ureña, 1970:50) and the "botanical and zoological emporium of the continent" (Pittier in Bonilla, 1985:i).

The goal of this thesis is to investigate the Costa Rican model of environmental conscience. Several questions quickly emerge: what is an environmental conscience and how can it be

* Translated by the author of this thesis. (Note: all subsequent quotations in Spanish throughout this paper have been translated to English by the author and will not be cited individually, other than the source citation itself.)

measured? Does the term imply the thoughts and beliefs of all or a majority of the country's residents, the actions its government takes, or a philosophical ideal in an ethereal setting?

The position of this paper will be that an environmental conscience includes balanced helpings of all these concepts. The philosophical problem inherent in this suggestion, however, lies in the word 'conscience'. If the Webster's New Collegiate Dictionary (1976:240) defines 'conscience' as "moral goodness, intentions to do right . . . a faculty, power, or principle enjoining good acts" then an ethical dilemma surfaces about whose "morals" will be used to determine "good acts" or doing what is "right". Perhaps 'consciousness'--"the quality or state of being aware" (ibid.:241) or 'ethos'--"the distinguishing characteristic . . . moral nature, or guiding beliefs" (ibid.:393) would be more appropriate terms for this topic but they sadly lack an innate sense of action. No, the conservation history of Costa Rica has been far more potent than a mere awareness or awakening of environmental beliefs. It has been a history of translating those beliefs into active measures to preserve the environment.

The purpose of this paper, then, will have to focus on defining why working to protect Costa Rica's environment is understood to be a morally "good act". To address this need, the paper will analyze Costa Rica's unique geography in view of how it historically has been exploited and the magnitude of environmental problems that have resulted. The harm thus quantified, the paper's purpose will shift to uncover the ingredients

(conscious beliefs) that led to changes in policy (conscious actions) regarding the environment. Robert Disch, from the Pratt Institute in New York, suggests that these factors are more than just "good acts". In his book The Ecological Conscience (1970: xiv), he equates a better understanding of the "non-human world" with "values for survival" to avoid the "physical demise" of a country. University of Maryland philosopher Mark Sagoff in the Economy of the Earth (1988:128) posits that this "conscience" entails "a sense of responsibility . . . to the land." Together, these beliefs and actions can be understood to include what the well-known Costa Rican botanist and environmental activist Luis Fournier (1983:6) has called

the acknowledgment of the importance of natural resources for [a people's] existence and of the problems that a country endures from the destruction or poor use of them . . . [in other words] man's rational use of the environment.

"Rational use" (an action) helps to define environmental conscience but is a poor tool to measure it and in and of itself can be open to debate. In Fournier's book Ecology and Development in Costa Rica (1981:21,26) he suggests that this concept, as stated above, implies a vision for the future:

. . . in reality, we are no longer just a few people clamoring for a rational use of the environment, and what in the past for many was merely a romantic or utopian dream, has been transformed into something vital for the future of the country, and is coming to be understood by a great number of Costa Ricans. . . in fact, a large portion of the population is actively conscious that the future of the country will depend on the rational use of the environment.

The intent here is to follow the development of this Costa Rican

pattern of thinking. Disagreement exists whether this is a long, historic phenomenon--pre-dating and including the colonial era--or if it is a recent product of late twentieth century scientific understanding. Many writers, including anthropologist Maria Bozzoli de Wille (1986, personal communication 1992) and geographer Carolyn Hall (1985) point to the sustainable, ecologically harmonious ways of pre-Columbian Indians in Costa Rica as a base for an enduring environmental conscience. Environmental activist, legislator, and former First Lady of Costa Rica Karen Olsen de Figueres (personal communication 1992) and biologists Luis Gómez and Jay Savage (1983) go further to suggest that the colonial and neo-national eras represented ecologically responsible agriculture and continued the conscientious thought pattern.

On the other hand, Central American historian Lowell Gudmundson (1989:29) argues that "pre-coffee Costa Rica was no self-sufficient household economy" and that the change to coffee monoculture in the mid-1800's was towards "agricultural specialization". Many researchers posit that environmental awareness has resulted only in the past twenty-five years. Estrella Guier (1982:61), the director of environmental education at Costa Rica's State Extension University, remarked: "It is only recently that a conscience among some towards a rational and balanced exploitation of natural resources has been created." Fournier (1981:20-21) agrees: "Fortunately in the last decade [1970's] in Costa Rica there has been a change of attitude in the people,. . . with respect to the problems of the environment." He continues by

saying that the change of attitude is due in large part to the "work of the national education system . . . and equally to the Costa Rican politicians who gradually have come to understand the importance of natural resources" (ibid.).

Both sides will be examined herein. Likewise the second question merits attention: how is an environmental conscience measured for success? Has Costa Rica managed its natural resources rationally, and if so, what mechanisms (structural or attitudinal) have proven successful and are in place to continue the trend?

This paper seeks to address these issues by discussing problems and solutions in Costa Rica's environmental history. Emphasis will be placed on conservation concerns--agriculture, education, and public lands management, especially stressing the role national parks and protected areas has played in developing an environmental conscience. Surprisingly, a large percentage of public land was protected during the severe economic crisis of the early 1980's. Reporting how this unique, perhaps paradoxical, experience transpired (and hopefully to redress the void in analysis on this subject in the literature) will be an integral facet of this paper's mission. A research trip to Costa Rica in June 1992 was instrumental in pursuing these lines of thought and helped immensely in understanding the Costa Rican system.

In limiting the scope of this research, in-depth discussion and analysis on pesticide abuse, urban pollution, air and water quality concerns, and chemical contaminants have been left to

other more specifically scientific literature.* Nor is this paper a comparison of Costa Rican conservation efforts with those of other republics in the region (although unique features of Costa Rica's geography, history, and society will be weighed vis-à-vis environmental successes). Rather, this paper is an attempt to synthesize diverse elements of Costa Rica's past (natural history, government, education, etc.) to track the unfolding of a national environmental conscience. This interdisciplinary approach is part of the key to understanding how

the brief history of the development of Costa Rican conservationist thought . . . has evolved from a group of laws, regulations, and decrees, that despite their defects and faults, constitute a legal framework [to protect] the natural heritage of the nation (Fournier, 1991:87).

But to quote a Spanish proverb, all that glitters is not gold. This work would be terribly remiss and blind to the facts if it omitted a discussion of the serious challenges facing Costa Rica's environmental model. What will later in this paper be termed 'the grand contradiction' is the paradox of simultaneous development of the extraordinary national park system with massive deforestation in unprotected areas (Quirós, 1989). What initially sparked interest in this project was Costa Rica's admirable record of public lands protection. Excitement from learning that only since 1969 more than twenty-five percent of Costa Rica has been protected in one form or another (Barry, 1991:23) was

* For a detailed discussion of pesticides and chemical pollution in Costa Rica, see Lori Ann Thrupp (1988).

soon offset by discovering that over sixty percent of the country is deforested and that the rate is growing by four percent a year (Fournier, 1981:153; Carriere, 1991:188). Equally disturbing is that seventeen percent of the land is composed of highly degraded or seriously eroded soil (Calvo, 1990:355) rendering it almost useless for agriculture or reforestation.

Keeping things in perspective, however, is important. Oliver Wendell Holmes is credited with the thought that where things are now is less important than the direction in which they are going. And therein lies the hope for Costa Rica. In their environmental conscience and respect for nature, the people of Costa Rica have been motivated for a change in direction to preserve their natural heritage. Efforts to protect the environment and natural beauty of Costa Rica would be futile without the support of the people, as tropical biologist Allen Young (1981:30) states:

Apart from the futuristic thinking of some of the republic's recent leaders, the success of conservation-oriented activities such as the establishment of national parks would not have been possible without the tacit understanding and approval of the Costa Rican people in general. . . . Costa Ricans live close to nature and those living in the countryside exhibit both responsibility and fondness for wildlife, while the capital city of San José is a European-style, densely populated metropolis. . . . The 'people-scape' and landscape of the country as a whole exudes a sensitivity towards nature.

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I. Introduction: The Costa Rican 'Uniqueness' Factor

Costa Rica is already something of a model in Latin America. The enormous ecological variety encompassed in such a small area makes the country a tropical laboratory. . . .

- Carolyn Hall (1985:309)

The first thing to understand about Costa Rica's environmental history is how the country is so specifically different in many ways from the rest of the world. A preliminary glance reveals that Costa Rica is one of the least impoverished countries in the Third World (Barry, 1991:27), has the highest per capita income in Central America (Young, 1981:32), maintains one of the highest literacy rates (ninety-eight percent) in the developing world and leads Central America in elementary and higher education (Weinberg, 1991:100; Joyce, 1991:37). Likewise, with the possible exception of Cuba, Costa Rica enjoys the best federal health care coverage in the Western Hemisphere (ibid.) and has one of the highest life expectancy ages (seventy-four years) and one of the lowest infant mortality rates in Latin America (Leonard, 1987:200).^{*} Remarkably, Costa Rica has no military. Abolished in 1948 under the reform platforms of José Figueres, army fortresses were turned into museums and federal funds were freed for other endeavors--a stand which has been warmly supported by the people of Costa Rica (Bird, 1984). Gabriel Ureña (1977:22),

^{*} Leonard (1987:201-203) goes on to report that Costa Rica has the fewest deaths related to infective or parasitic diseases, malaria, typhoid, or TB in Central America and is tied with Panama on percentage of its people (eighty-four percent) with easy access to potable water.

echoing the sentiment of many who call Costa Rica the "Switzerland of Central America", goes so far as to state that militarism ("that political plague of other countries in Latin America") could not prosper in Costa Rica where "law, peace, and a respect for human dignity are sacred precepts."* And pertinent to this paper, of course, is the fact that Costa Rica has developed the "most complex system" of protecting wildlands in all of Latin America (McFarland et al., 1984:592).

Protecting wildlands means protecting species--which Costa Rica has in incredible abundance. There are 850 species of birds, 220 species of reptiles, 160 species of amphibians, 280 species of mammals (almost half of which are different species of bats), 130 species of fresh water fishes, and approximately 9000 species of vascular plants (four percent of the world's total) of which 1200 are different species of orchids and 1200 are different species of hardwood trees, in some places at a density of 200-300 species per hectare (Guess, 1979a:5; Boza, 1987:7; Fundación Neotrópica and Conservation International, 1988:4). The number of insect species is another story. Already numbered in the tens of thousands, research entomologists continue to discover thousands of previously unidentified species from the tree canopies of

* Costa Rica does, however, maintain active national police units (the Civil and Rural Guards) and nine government agencies control their own security forces (Barry, 1991). Some units receive some military training, but, as Barry points out, there is no central command structure to enable these security forces to assert undue influence over Costa Rican society, as is frequently the case elsewhere in Latin America.

Costa Rica's many tropical forests.* Even more interesting is that this speciation occurs in such a small area. Costa Rica is 19,600 square miles (just smaller than West Virginia) and is only 250 miles long and 150 miles wide at its widest point (Young, 1981:32). Yet the number of plant and animal species there is greater than that of the United States and Canada combined making Costa Rica a veritable "naturalist's paradise" (Shelford in Stan-sifer, forthcoming:3).

This "mysticism of Costa Rica" (F. Morris, personal communication 1992) in a large way is explained by the country's unique geography. Formed during the Pliocene (only three to four million years ago), an uplift united a small archipelago to become a land bridge between North and South America (Boza and Mendoza, 1981). Costa Rica is located in the middle of this region which Hall (1985:1) refers to as the only place in the world that is "both interoceanic and intercontinental." Such a meeting point allowed the free transfer of species from north to south, greatly enriching the flora and fauna of Costa Rica (Pittier, 1901; Boza and Mendoza, 1981; Young, 1981).

But the abrupt variations in topography and climate played an even greater role in species diversification in Costa Rica. What Hall (ibid.) has called a "great complexity of surface land

* The National Institute for Biodiversity (see Part V) is working to inventory Costa Rica's species of plants and animals. Insect collectors were bringing in some 100,000 specimens a month in 1990 when the director had to ask that they try to restrain themselves! (Wille, 1991:16).

forms" includes three distinct mountain ranges (the Central Cordillera, the Guanacaste Cordillera, and the Talamanca) which climb up to 6000 feet elevation, and five major natural areas.* Different "microclimates" have developed in each region

to produce an ecological diversity peculiar to the world's tropical, mountainous regions where elevation and aspect are responsible for more rapid and qualitatively different environmental changes than those associated with variations in latitude. (Hall, ibid.)

Leslie R. Holdridge, an internationally respected forestry biologist who spent much of his adult life in Costa Rica, developed in the 1960's and 70's a "sophisticated bioclimatic classification of life zone ecology" for his adopted country (Hall, 1985:23). Holdridge (1971) identified twelve distinct life zones in Costa Rica (e.g. tropical dry forest, montane wet forest, etc.) based on temperature, rainfall, evaporation, humidity, and elevation. That these different life zones are in such close proximity to each other in such a small area creates a "biogeographical combination" (Bonilla, 1985:9) or a "complex ecological mosaic" (Hall, 1985:1) of species diversification. In evolutionary terms, a "riot of adaptations" (Young, 1981:12) occurred as plants and animals specialized to fit into such complex environments.

The history of another species in Costa Rica, Homo sapiens, has also been shaped by the unique biogeography of the area.

* They are: Central Valley, Northern Wet Caribbean Region, Dry Pacific Zone, Southern Wet Pacific and Southern Wet Caribbean regions (Young, 1981).

Dense tropical forests and steep mountainous terrain prevented a large pre-Columbian Indian population to thrive in Costa Rica. It has been estimated that only about 27,000 indigenous people were living in Costa Rica at the time of the Spanish conquest and that they lived in a sustainable, natural balance with their tropical environment (Fournier, 1981:25). The Indian population today is nearly the same, 24,000 (Bozzoli de Wille, 1986:15)--far less than in other parts of Central America, but they share the country with approximately 3,000,000 other residents.

Spaniards in the 1500's were not all that impressed with Costa Rica. Columbus may have thought the coastal areas to be scenically beautiful and held high hopes that riches there were awaiting his arrival (hence his naming the area 'Costa Rica'), but gold and other minerals were not to be found and the humid, thickly forested terrain did not seem very hospitable to early explorers and settlers coming from the more temperate and dry regions like Castile and Extremadura in Spain (Fournier, 1981; Stansifer, forthcoming). Hence, during the colonial era Costa Rica evolved quite differently than other areas of the Spanish world. Far away, and not easily accessible from the capital at Guatemala City, Costa Rica had little early agricultural development and therefore less impact on its natural environment. One study suggests that "because Costa Rica was a relatively poor, isolated and thinly populated corner of the Spanish Empire, the loss of forest cover associated with European settlement was limited" (Carriere, 1991:188). Another study points out that only a few

thousand Spaniards ever settled in Costa Rica between 1502 and 1821 but that the "poorest Spanish colony became the most prosperous republic" (Hall, 1985:59). Again this unique feature of Costa Rica's past was largely due to its environment.

By the 1840's it was discovered that the soil and climate of the volcanic montane region of Costa Rica's central valley was ideally suited for the production of coffee (Carriere, 1991). At the same time in history there was a soaring world demand for coffee and through the efforts of an English merchant named William LeLecheur (who introduced Costa Rican coffee to Great Britain in 1843) a strong European market was established (Gómez and Savage, 1983; Hall, 1985). But coffee in Costa Rica is a unique example of how a developing agricultural commodity did not necessarily impair the environmental well-being of a country. While Jean Carriere (ibid.) refers to this as Costa Rica's "first wave of deforestation" he also shows how most of the country remained under forest cover until the 1950's. Another study credits Costa Rica's "coffee monoculture" as being

a rare exception to the general rule of monocultures producing a dependent, stale economy and subsequent underdevelopment. Coffee cultivation in mid-1800's Costa Rica established a social climate that encouraged strong development of natural sciences. (Gómez and Savage, 1983:2)

Costa Rica accomplished this by opening up trade patterns with a hitherto closed European market. This provided the stimulus for scientists to travel to Costa Rica to study its unique geography and later to instruct Costa Ricans about the more scientific end

of their natural resources. Most growers were small farmers who were responsible land stewards instead of elite large landholders as was the typical latifundista experience in much of Latin America. A middle class emerged that not only cared for the land but established the base for a stable democracy that would force fewer pressures upon the natural environment (Gligo and Morello, 1980; Olsen de Figueres, personal communication, 1992).

Costa Rican agriculturists soon discovered that their country's "large number of life zones permit[ted] the cultivation of a much wider range of crops than would otherwise be possible at this latitude" (Hall, 1985:29). Bananas, Costa Rica's next agricultural boom, and other crops of the twentieth century, however, were not as friendly to the environment. But a basis was established for creating an environmental conscience by the very geographic make-up of the country. A cyclical pattern evolved: the geography which made Costa Rica unique led at first to the development of a different kind of agricultural society--one based on respect and stewardship of the land. Eventually, as agricultural conditions and international markets dictated, more and more forested land was turned into croplands, plantations, and pastures. This dangerous exploitation of natural resources, then, aroused a dormant ecological conscience to address the need to protect what remained of the nation's natural heritage. Problems and solutions of this environmental model will be examined in the remainder of this paper.

II. A Legacy of Scientific Thought and Tropical Research

To those who with effort, caring and dedication from 1841 to 1941 established the basis for biological sciences in our homeland. May their labor be a permanent example for future generations.

- plaque at entrance of the University of Costa Rica's School of Biology

Listed with the above message are the names of twenty-three professional biologists (some foreign and some Costa Rican) who have played a profound role in the environmental history of Costa Rica. Part of Costa Rica's uniqueness has been its historic ability to lure an amazing number of foreign scientists and to establish a sound training system for local scientists to study and understand the nation's diverse natural history. Mario Boza (1978:2), a leading Costa Rican environmental activist and currently the vice director of the Ministry of Natural Resources, states:

The diversity and wealth of Costa Rica's flora and fauna, as well as the majesty of its countryside, have attracted the attention of scientists and naturalists from all over the world since the mid-1800's.

The legacy of scientific investigation--indeed the drive to understand Costa Rica's biological uniqueness--became an important seed for the development of a national environmental conscience. The need to understand tropical ecology led to the appreciation of conserving natural resources (Bozzoli de Vargas, personal communication, 1992). Luis Fournier (1981:26) remarks that

profiling our history toward the conservation of the environment, Costa Rican ecological thought developed from the numerous observations about the country's natural history in the past century and early decades of this century by foreign and national naturalists.

Tracing the history of interest in Costa Rican ecology and conservation goes back to the sixteenth century. Fernández de Oviedo (a Spanish naturalist who travelled to colonial Costa Rica in the 1700's) was one of the first to recognize the area's distinct biodiversity and warned against deforestation (ibid.). While there were early decrees and proclamations for forest preservation and soil conservation in the 1770's and 1830's, there was not a base of support for conservation issues in Costa Rica for the next few decades.

Largely ignored by the colonial government, by the time of independence Costa Rica was one of the poorest and least developed areas of the United Provinces of Central America. After separating from the federation, Costa Rica never had the wherewithal nor the population to support higher education. There was virtually no national scientific or professional training. One study suggests that by 1845 Costa Rica had no bookstores, hospitals, universities (elementary education was only marginal), research or scientific organizations, or even theatres (Stansifer, forthcoming). The study goes on to say that the few scientifically trained persons in Costa Rica at this time were either Guatemalans, Nicaraguans, or Costa Ricans who had studied at foreign schools. Another study claims that European naturalists were at first more interested in studying the more geologically wealthy regions of Mexico and Peru because of world fascination with gold and silver (Gómez and Savage, 1983). Two events outside of Costa Rica, however, reversed forever the scientific

community's disinterest in Costa Rica's tropical ecology: international demand for coffee and speculation for a trans-isthmus canal in lower Central America.

Part of coffee's role in Costa Rican conservation history has already been told. Not only did the railroads, built to transport coffee beans to port, open up many unexplored areas of the country, but the coffee trade with Europe brought many foreigners to Costa Rica. Some were scientists who, because of socio-political repression and scientific stagnation in their home countries, were excited by the prospect of marketing their services in a new area and by the adventure of visiting a poorly understood biological region (*ibid.*). Schools and fine arts developed more quickly with the advent of foreigners, triggering more communication and travel between Europe and Costa Rica. News of the country's vast diversity sparked interest for European naturalists to visit and "those who came usually stayed." (Gómez and Savage, 1983:2).

Towards the end of the nineteenth century when a growing commercial interest emerged for constructing a Central American canal to connect the Atlantic with the Pacific, attention focused on Nicaragua, Costa Rica, and the Colombian province of Panama. Scientists were drawn to the region to investigate canal site possibilities. Two German naturalists, Moritz Wagner and Karl Scherzer, became enchanted with Costa Rica and stayed to research its natural history. Their writings, including the German work Die Republik Costa Rica, "probably did more to draw European

scientists [to Costa Rica] than any other work" (Stansifer, forthcoming:4).

One such scientist who followed was the Danish botanist Anders Sandre Ørsted* who was the first to publish a detailed description of Costa Rican plants. Others were William More Gabb (from Great Britain) who studied Costa Rican geology, paleontology, and zoology, and Joseph Warscewicz (from Lithuania) who studied horticulture and ornithology and was the first to send diverse bird collections to the most respected museums of natural history of the time in Berlin and London. In the 1880's F. Duncane Godman and Osbert Salvin studied in Costa Rica and published their Biologia Centrali-Americana, one of the most complete biological works about the region up to that date. The German geologist and naturalist Karl Sapper also conducted investigations in Costa Rica, and the American ornithologist George N. Lawrence was the first to catalogue Costa Rican birds, listing 511 species--two-thirds of all known Costa Rican bird species today (ibid.). The research of these scientists inspired even greater interest in Costa Rica abroad.

Two other German scholars who went to Costa Rica in the mid-1800's were yet more influential in the legacy of tropical research. Alexander von Frantzius and Karl Hoffmann, both medical doctors, landed in Costa Rica somewhat by chance. Von Frantzius

* Ørsted was the beginning of an interesting, perhaps coincidental Danish/Costa Rican environmentalist connection which will be discussed later in the paper.

was advised to move to the tropics to improve his health and Hoffmann was intrigued by the adventure of exploring mountains. While there they both practiced medicine but in their spare time climbed Poás and Irazú volcanoes, coming intimately to know the ecology of both and producing major collections of flora and fauna. Von Frantzius was the first scientist to catalogue Costa Rican mammals and, according to Gómez and Savage (ibid.) his botanical explorations and publications "made Costa Rica known to the scholarly world." He also produced the first academic work on Costa Rican climatology. Hoffmann became known for his taxonomy of Costa Rican species (of which twelve bear his name today) and also sent impressive collections to Berlin.*

Bringing new information to the scientific community, however, was not von Frantzius' most pronounced mark on Costa Rican ecological research. Teaching natural history to Costa Ricans was. Later in life, von Frantzius opened a pharmacy, the back room of which was used as a laboratory and meeting place for students. Three such Costa Rican students, Jose Zeledón, Anastasio Alfaro, and J. F. Tristán, (known as the "drugstore gang") became close assistants, accomplished biologists, and early leaders in the effort to research tropical issues and educate others.

* An interesting historical sidenote is that Hoffman served as an army surgeon for the Costa Rican forces in the battle against American filibuster William Walker in 1856. While in Guanacaste Province he noted the incredible diversity of bats which he collected and studied. His work in this area became the first scientific research of bats in Costa Rica.

An important step in Costa Rica's favor and a move that was unknowingly environmentalist, was the government's spirited attempt in the mid-1800's to improve the educational system. The University of Santo Tomás was founded in 1844 as a way to attract scholars and educate professionals. Without enough local teachers and scientists, however, the government decided to recruit European educators to teach Costa Ricans.* The administrations of Jesús Jiménez and Tomás Guardia in the 1860's invited many German and Swiss teachers. Many foreigners who came, left after short stays discovering that they were expected to spend more time teaching than doing research. One who stayed was Helmuth Polakowski, who became an expert in tropical botany.

The University of Santo Tomás was abolished in the 1880's, however, by the preceding president, Bernardo Soto. His influential and politically powerful minister of public instruction Mauro Fernández believed that no university could succeed without a strong secondary school system in place. He was actively involved in starting the academically challenging Liceo de Costa Rica, changing education to be sponsored by the state instead of by the church, enacting legislation to make education compulsory to the seventh grade, opening high schools to women, and beginning an even stronger push to attract foreign teachers. Several

* Charles Stansifer (ibid.:6) explains that an attempt was made to encourage Spanish educators to move to Costa Rica which was surprising "since Spain was not generally considered in the vanguard of scientific educational leadership" in the 1800's.

more Swiss scholars accepted the challenge in the 1880's. One, named Henri Pittier, was another individual who was destined to change the course of the country's ecological thought and begin the "golden period of Costa Rican natural history." (Gómez and Savage, 1983:4).

Described as "determined, indefatigable and tyrannical", Pittier had a bold "multidisciplinary approach to field biology (ibid.). To seriously acquaint himself with the country, he climbed every volcano more than once, lived with indigenous Indian tribes, and collected as many specimens as he could to "amass a body of information unsurpassed to that date" (ibid.). He organized the National Agricultural Society, created the National Observatory, recruited many other scientists to study in Costa Rica, and with the help of others developed the "largest herbarium in Latin America" (Stansifer, forthcoming: 12). More importantly, he founded and succeeded in acquiring government funding for the Physical Geographic Institute (IFG--called the National Geographical Institute after 1914). This institute, soon to become one of the leaders of its kind in Latin America, was in charge of collecting biological data, managing the herbarium, recording all meteorological information, researching national agricultural problems, and perhaps most importantly, accurately mapping the republic. All of these successes, unheard of in much of the rest of Latin America, created a national base to encourage scientific

thought and to spur others to pursue research topics in Costa Rican natural history.

Disagreeing with the government's 1904 decision to place the IFG under the auspices of the National Museum, Henri Pittier moved to the United States and accepted employment with the U. S. Department of Agriculture. Capable scientists like Adolphe Tonduz, Carlos Werklé, and George Cherrie carried on Pittier's work in Costa Rica, and Anastasio Alfaro (one of von Frantzius' "drug-store gang") became director of the museum and the IFG. By the time Pittier left Costa Rica, "sciences from anthropology to limnology flourished" (Gómez and Savage, ibid.).

The National Museum, then, became the focus for scientific research. Alfaro (only twenty-two years old at the time he was appointed director) had the able help of José Zeledón. Zeledón was sent to study at the Smithsonian Institution in Washington, D.C., established important liaisons with American scientists, and "from then on the flow of U. S. researchers [to Costa Rica] has never stopped" (ibid.). Some of these included Edward Cope and Edward Taylor in herpetology, and Phillip and Amelia Calvert in entomology. The Calverts wrote the "unexcelled" (ibid.) field biology study entitled A Year of Costa Rican Natural History. The Swiss biologist Paul Biolley also made important contributions in entomology and malacology in these years. By 1914 Costa Rica had become the center of scientific research in tropical America (Stansifer, ibid.).

Without a university or even an agricultural school (until 1926) to support professional research efforts, however, the

period from the 1920's to the 1950's witnessed a decline in Costa Rican scientific study. Field research was viewed by many Costa Ricans as a "pastime for the eccentric or the wealthy" (Gómez and Savage, ibid.), causing few Costa Ricans at this time to be interested. An attempt in the 1920's to reopen a university hindered rather than helped these efforts because of a lack of trained faculty in the biological sciences. When the University of Costa Rica finally was established in the 1940's the National Museum was placed under its direction, managed poorly, and the specimen collections of earlier scientists were ruined (ibid.).

Despite these setbacks, progress occurred with the establishment of the National School of Agriculture in 1926. Staffed with people like José Orozco (a silviculturist who urged forest protection), José Arias (who developed an early conservation plan of action), and Rafael Chavarría (a conservationist-minded director) this school was instrumental in teaching farmers how to avoid erosion, proper use of controlled burning, and other ag-conservation techniques. The School of Agriculture went on to play "a great role in helping form conservationist thought" (Fournier, 1991:41). One instructor there, Enrique Jiménez (educated in Belgium), taught with a "conscience for environmental problems" (ibid.), later became Costa Rica's Secretary of Agriculture, and was instrumental in the passage of the Ley de Quemaz (a law regulating controlled burns) to protect the forests.

Progress also occurred in the 1930's and 40's through the work of an exceptionally bright Costa Rican scientist named

Clodomiro Picado Twilight. Educated at the Sorbonne, Picado returned to his homeland "to dedicate himself to the study of Costa Rica's natural riches" (Gómez and Savage, ibid.). He published hundreds of scientific articles, pioneered research on bromeliads, wrote The Poisonous Snakes of Costa Rica, and has been called the "first Costa Rican academic biologist" (ibid.). Unfortunately Picado died quite young in 1944 and never lived to be a part of the University of Costa Rica (UCR). His statue, however, graces the front lawn of the School of Biology at UCR as an inspiration to future biologists.

But while Clodomiro Picado conducted independent research, and efforts of the National School of Agriculture centered primarily on conservationist farming practices, there still lacked a professional outlet for scientific study and a center to train others in tropical research. This changed in the 1950's via the expansion of the University of Costa Rica. In the early fifties Antonio Balli (an Italian biologist) and Rafael Lucas Rodríguez (a Costa Rican educated at the University of California-Berkeley) organized the biology department at UCR. Rodríguez, a man with "great vision for the future" (Fournier, 1991:55) published a forward looking work on areas in Costa Rica that required protection and was instrumental in working to have UCR's biology department changed to become the School of Biology, a separate division at the university, in 1955. A full-time staff of professional biologists was hired and Archie F. Carr, a herpetologist at the University of Florida, designed the curriculum.

Carr spent years studying and lobbying for the protection of the green sea turtle (Chelonia mydas) which bred on Costa Rica's northeast coast. The School of Biology became one of the best of its kind in Central America and has served as a spring-board for research into tropical studies for Costa Rican and other Latin American students. It was dedicated to Dr. Rodríguez in 1979. (A national wildlife refuge, established in 1977 near Palo Verde National Park, also bears his name.)

The University of Costa Rica is important in Costa Rica's conservation history and development of environmental thought in other ways also. The National School of Agriculture (changed to be called the School of Agronomy) became a division of UCR and continued its instruction of conservation values. The Costa Rican zoologist Álvaro Wille (educated at the University of Kansas) developed the entomology section there which likewise has become a valued, regional center for tropical issues (Gómez and Savage, 1983). UCR's law school also became actively involved in environmental policy through its Center for the Study of National Problems (Fournier, 1991).

The momentum continued with the development of organizations promoting conservation issues in Costa Rica. In 1942 the Inter-American Institute for Agricultural Sciences (IICA) was founded in Turrialba by the Organization of American States (OAS). It specialized in training individuals in agricultural sciences, forest conservation, and wildlife management. It exists yet today as an independent organization (splitting from the OAS in

1972) and is called the Centro Agronómico Tropical de Investigación y Enseñanza (CATIE). In the early 1950's American Quakers, fleeing a militaristic U.S. government, settled at Monteverde in north central Costa Rica, practiced low tech agriculture, and established a protected cloud forest reserve. In 1959 Archie F. Carr founded the Caribbean Conservation Corporation dedicated to protect nesting grounds of green sea turtles at Tortuguero. The Tropical Science Center (TSC), a private consulting firm, was established in 1962 by three American biologists-- Leslie Holdridge (an internationally known tropical forester), Robert Hunter (a forester and land-use specialist), and Joseph Tosi (an agricultural scientist). The TSC assisted the IICA with many projects, opened a biological station at Rincón de Osa, and organized many conferences and training sessions. In 1971 the TSC purchased adjacent land to the Quakers' Monteverde Forest, expanded it into a 10,000 acre preserve, and became its managing agent for research and conservation.

By the early 1960's research and instruction on tropical ecology was increasing in the United States. Six leading universities in this field (Michigan, Florida, Miami, Kansas, Harvard, and Washington) saw the need to consolidate efforts to develop a research field station in the tropics. Costa Rica was chosen as the site because of the number and proximity of its geographic zones, its broad biological diversity, and its politically stable government (Gómez and Savage, 1983). In 1963 the consortium of these six schools plus the University of Costa Rica

formed the Organization of Tropical Studies (OTS). Its mission was "to provide leadership in education, research, and the wise use of natural resources in the tropics" (Clark, 1990:9) and according to one of its originators, Jay Savage of the University of Florida, (in Gómez and Savage, 1983:8)

to develop a center for advanced graduate education in tropical sciences . . . [and] to develop a cadre of knowledgeable ecologists who had course and field experience in tropical environments.

The OTS initially suffered from scientific imperialism ("the big stick" or "missionary attitude") but later learned to co-operate with its host government and now always includes Costa Rican and other Latin American students and instructors (Brown, unpublished research 1990). Over the years more than 700 papers have been generated by OTS research and many ecologists trained there have gone on to work for conservation issues or have become teachers themselves (Clark, 1990:16). Gómez and Savage (ibid.) state that "almost every major figure in tropical biology today" has been associated with the OTS. Norman Scott and Donald Stone were early OTS directors who had an environmental vision for tropical education. Daniel Janzen, one of the OTS's first students and who later taught there, moved to Costa Rica and has spent much of his life in researching and working to protect the tropical dry forest environment of Guanacaste. Another shining example of an OTS 'product' is Rodrigo Gámez, a plant virologist, former biology professor at UCR, and past natural resources advisor to President Óscar Arias. Gámez, who currently directs Costa

Rica's National Institute for Biodiversity and an OTS board member, states:

In my own case, my association with the OTS helped open my eyes to the importance of biological diversity, particularly for a country like Costa Rica. From trying to figure out what all those gringos are doing down there, many Costa Ricans have developed a greater appreciation of the nation's biological wealth. The OTS has played a crucial role in providing credibility for conservation (as quoted in Tangle, 1988:384).

A big boost to the organization occurred in 1968 when Leslie Holdridge sold his property known as "La Selva" (the forest), an intact, relatively undisturbed forest ecosystem (Clark, 1990) that was a hold-out in an area with increasing logging and cattle pressure, to the OTS. Gómez and Savage (1983:9) claim that Holdridge's "foresight in preserving a sample of undisturbed forest cannot be overstated." Located near Puerto Viejo in northeastern Costa Rica, La Selva became the OTS' biological station and center of tropical research. Norman Myers (1986:397) explains that while only seven and one third square kilometers, La Selva has half as many species as all of California, including 320 species of trees, 394 species of birds, 143 species of butterflies, 122 species of reptiles and amphibians, 104 species of mammals, and forty-two species of fishes. From this incredible diversity,

the varied and numerous investigations carried out at La Selva are an important reason why the tiny country of Costa Rica is one of the world's largest active research sites in tropical field biology (Clark, ibid.).

In the 1980's La Selva was expanded to border Braulio Carrillo National Park (the combination of which has been identified by

UNESCO as a 'World Biosphere Reserve') and research usage increased fourfold, with the number of individual researchers there increasing by 257 percent in just six years (ibid.). Laboratory and lodging facilities have also expanded, and by 1990 an average of twenty researchers a day were studying at La Selva. Fully one half of all OTS usage is by Costa Rican biologists and students and Costa Ricans are on the staff of every OTS project (ibid.). Today the OTS is a consortium of fifty-two U.S. and Costa Rican universities. The mutual advantages of the OTS being located in Costa Rica are explained by current OTS co-director David Clark (1990:21):

the most important of OTS' experiences . . . is the long history of positive relations it has enjoyed with its host country, the Republic of Costa Rica. This special relationship affects research in innumerable ways, from the ease in which research permits can be obtained to the willingness of talented Costa Rican biologists to collaborate in joint projects. Costa Rica is unusually receptive to foreign scientists and the OTS has benefitted greatly from this attitude. For its part, Costa Rica has benefitted ecologically, educationally, and scientifically from the relationship.

One reason that all of these organizations and programs have been successful is due to Costa Rica's lack of an 'anti-gringo' sentiment (Janzen, 1982; A. Morris and F. Morris, personal communications, 1992). Janzen explains that foreign biologists are generally considered for what they are--biologists and not gringos, and that most Costa Ricans support the need to conserve areas for future generations. Likewise, as mentioned, CATIE, TSC, and OTS, while developed by Americans and other foreigners,

have usually worked well with the government and included Costa Ricans in planning, advice, training, and employment.

Other important figures in Costa Rican history appeared in the 1960's and 70's. Names like Gerardo Budowski (an expert in forest succession, one time director of CATIE and of the International Union for the Conservation of Nature and Natural Resources-IUCN), Luis Fournier, S. Salas, and R. Daubenmire (botanists who made important contributions to forest phenology), Gary Stiles and W. L. Ramírez (zoologists who specialized in ecology and reproduction of natural ecosystems), and Alexander Bonilla (UCR biologist and avid environmentalist) all represent part of the result of Costa Rica's scientific legacy. Others advocated conservation and changes in policy by becoming involved in government agencies. Biologists like Mario Boza (a devout conservationist who became the first director of Costa Rica's General Forestry Directorate and National Park Service), Rodrigo Zeledón and Carlos Quesada (who developed guidelines on the rational use of the environment), Álvaro Ugalde (one of the first graduates of UCR's School of Biology, long time advocate of conservation measures, and current director of the National Park Service), Luis Diego Gómez (a botanist who helped revitalize the National Museum to regain its former status as a center to stimulate Costa Rican field biology), Rolando Mendoza (an avid national parks and protected areas proponent), Tobías Meza Ocampo (a specialist in wildlife management) among many others

are products of Costa Rica's emphasis on science who represent this group.

Much of these scientists' work was financed through CONICIT (Consejo Nacional de Investigaciones Científicas y Tecnológicas), which is similar to the National Science Foundation in the United States. Established by the government in 1973, CONICIT has assisted scientists by funding both large scale programs (i.e. the national Plan de Desarrollo--a long-range research priority setting plan) and small scale projects (i.e. plant pathology and species specific population studies) (Fournier, 1981, 1983; Brown, unpublished research 1990). The government's support of CONICIT is another reflection of the nation's environmental conscience.

While the percentage of Costa Ricans who are scientists is small (and of those, the percentage of field biologists even smaller) (Janzen, 1982:131)--which is typical of most, if not all, countries of the world, interest is there, numbers are growing, and a strong educational system is in place to foster scientific thought and conservationist policies. One study concludes:

Costa Rica now has a cadre of biologists whose orientations have been shaped by the new theoretical ecology, the ecological movement, and the stimulus of the OTS. Through their efforts, Costa Rica has a solid scientific base in its CONICIT, its universities, and the National Museum. It has an awareness of ecological problems and the proper attitude to face [its environmental] dilemma (Gómez and Savage, 1983:10).

Daniel Janzen (1983:x) believes that this base will be needed because of "how scanty our knowledge [really] is regarding Costa

Rican natural history." Believing that present research will soon be outdated, he views the need as great for future well-trained ecologists. Knowing as much as possible about the natural environment, how ecosystems are interrelated, and how they affect humans (as well as how man affects nature) is the key to understanding why and how to protect it. But if the number of Costa Ricans with advanced degrees in the biological sciences is small, the number of Costa Ricans who support conservation is large. Most may not actively lobby for ecological issues, but they do support the causes that will preserve their natural heritage (A. Morris, Olsen de Figueres, personal communications 1992). This support is rooted in the legacy of Costa Rica's emphasis on tropical science and is manifested in its society today.

III. The Environmental Problem

An Historical Setting

From the beginning of humanity, man has maintained a narrow contact with nature and has obtained from it the necessary resources for his subsistence. . . . Contemporary man, in the same form as his long-gone ancestors, depends on the natural environment to satisfy his basic needs.

- Luis Fournier (1983:5)

The point at which dependence on the natural environment becomes exploitation of the natural environment is the problem to be addressed here. Today, as was noted earlier in the paper, a large percentage of Costa Rica is deforested and suffers from degraded land, erosion, and habitat loss for endemic species of flora and fauna. Exactly how this scenario developed deserves careful, historical study to understand Costa Rica's response to the problem.

Costa Rica's unique geography forged a distinct land-use pattern for native Indians and European settlers. Bozzoli de Wille (1986:7) argues that indigenous people whose way of life "never deteriorated the natural environment" inhabited Costa Rica for at least 10,000 years" before the arrival of Spaniards. Indians recognized the areas where not much would grow and did nothing to alter that land's condition. In fact, Indians primarily developed agriculture in only four of Costa Rica's twelve life zones* and limited cultivation to such local crops as yuca (manioc),

* Premontane moist forest, Premontane wet forest, Tropical moist forest, and Tropical wet forest.

chiles, tomatoes, beans, corn, avocados, pejibayes, and other native fruits and vegetables (ibid.). Likewise, they gathered wild fruits and nuts, fished, and hunted native animals. Hall (1985:2) explains that "Indians exploited the natural environment while simultaneously conserving its potential resources."

In order to conserve, the Indians learned resource management techniques. They cleared forests with controlled burning in small parcels only (referred to as 'swidden agriculture') and, to guard against erosion during the rainy season, seeded the areas with various plants which provided a permanent cover (Bozzoli de Wille, 1986). Their small, stable population necessitated subsistence farming only--producing enough food for the family or basic community units. One study that compared archaeological evidence to present day indigenous activities concludes:

It might seem like a paradox that we consider the Indians as conservers of their environment because it was precisely from their system that we inherited the custom of burning terrain and even the practice of hunting, fishing, and gathering, or in other words, a production economy that is also extractive and exploitative (Ibid.:79).

The Spanish agricultural experience in Costa Rica, however, was exploitative in a different way. Early settlers not only gathered and cultivated native products but soon introduced such European commodities as sugar cane, citrus fruits, cereal grains, and livestock--what one study terms "ecological colonialism" (Hall, 1985:83) and another calls "the Europeanization" of the flora and fauna (Crosby, 1986:146). (Crosby, [1986:134] also labels this "biological expansion" or "ecological imperialism"

saying that Costa Rica embodied a "Neo-Europe" ideal.) Michael Redclift and David Goodman (1991:10) suggest that this concept can be defined as "an amalgam of what they [the settlers] discovered, what they introduced, and what they fashioned for themselves." Because the colonizers considered Indian ways inferior (less productive) to European agriculture, they initiated "a slow, but continuous, process of forest destruction to dedicate these lands to annual and perennial crops and to pastures" (Fournier, 1983:5). Pastureland and crops like tobacco, sugar cane, and other non-native species "disrupted the indigenous way of life . . . by introducing alien patterns of land-use" (Hall, 1985:1). The comparatively few resident Indians in Costa Rica were not used as slaves near to the extent that they were in the more mineral rich parts of the Spanish New World. Instead, they were pushed out of areas the European settlers wanted, or captured and sold as slaves for other parts of the Spanish Empire. Their "empirical knowledge of ecologically appropriate" agriculture was ignored by Whites and relegated to the small group of Indians isolated from colonial settlements (ibid.).

Environmental impact during the colonial era, however, remained limited due to Costa Rica's relative isolation and low population (see Carriere, 1991). While colonial farming practices were inappropriate for tropical environments, the crops produced were foodstuffs for a small colonial population at home or tobacco and cacao for limited regional export (Samper, 1978)

and therefore impacted very little land, most of which was in the central valley.*

Everything changed about twenty years after independence when coffee was found to thrive in Costa Rica's climate. Many thousands of acres in sloped, cool terrain were cleared for coffee plant cultivation. What developed for Costa Rica was an agricultural export commodity and its subsequent growth ramifications. Mario Samper (1978) and Lowell Gudmundson (1989) both point to the emergence of a coffee-elite class. These large landholders dominated the coffee industry and an agroexport oligarchy of merchant-elites controlled the trade of coffee to foreign markets. Both groups came to dominate politics and advocated increased production. Unlike many other parts of newly independent Latin America, however, this commodity was controlled by local Costa Ricans and not by foreign interests. As demand increased, the elite were motivated to turn more and more acres of previously undisturbed forest into coffee fields. Since 1845 (the beginning of the coffee trade with Great Britain) the government of Costa Rica provided further incentives for these efforts through lucrative tax subsidies to the growers (Guess, 1979a). For more

* Lowell Gudmundson, in his article "Costa Rica Before Coffee: The Village Economy of the Late 1840's" (1989:28), offers a provocative dissent from this line of thinking. He claims that Costa Rica was not actually very "pristine" during the colonial years and provides evidence of inequitable landholdings and "oligopolistic trade patterns" soon before and after independence from Spain. A majority of Costa Rica's shipping trade was controlled by one merchant in particular—Francisco Giralt, a wealthy Catalanian.

than forty years thereafter coffee was virtually Costa Rica's only export product (Hall, 1985).

But in Costa Rica an environmental awareness was already set in place, even during the early years of statehood. Not all farms were large landholdings, but small or large, as Fournier (1983:15) points out, this type of agricultural deforestation had little marked effect on the environment." The Spanish, and later the Costa Rican, growers had "enough ecological sense to settle in regions where the soil and climate were sufficiently satisfactory for agricultural activities" (*ibid.*).

Likewise there were early calls for conservation. As far back as 1775 the Spanish governor of Costa Rica, Juan Fernández de Bobadilla, issued a proclamation to discourage controlled burns on the basis that they were clearing too much land of forest cover and causing soil sterility. In 1833 and 1846 there were decrees regarding forest preservation (the latter pertaining to forest cover near cities), in 1888 a decree to protect watershed areas in mountains was announced, and by the early 1900's there were calls for a national forestry code. In terms of wildlife conservation, hunting laws were enacted by 1853. Another profound deterrent to environmental degradation was Costa Rica's low population which in the early years of independence was only around one person per square kilometer (Bonilla, 1985).

On the other hand, the advent of the banana industry towards the end of the nineteenth century and first few decades of the twentieth signalled an even greater agroexport phenomenon with

greater environmental consequences. Unlike coffee, banana plants grow in low, humid zones, can be harvested year round, and are less susceptible to yield variations (Hall, 1985). For these reasons and because there was a robust market in the relatively nearby United States, bananas were introduced into Costa Rica's Caribbean lowlands in the late 1870's (ibid.). They thrived there and came to dominate the agricultural landscape of lowland Costa Rica. But unlike coffee, banana production requires a large, expensive labor and transportation infrastructure. Plantations could be managed and produce shipped to ports only with great investments of capital. Capital and labor needs like this discourage small farmers from entering the banana business and open the door to foreign multinational corporations. This was the case in Costa Rica where the United Fruit Company came to monopolize the banana scene. But because absentee landowners have significantly less contact with the land, do not live in the host country, and are more interested in a good return on their investment than in ecologically sensible agriculture, the banana industry became damaging to the Costa Rican environment (Gligo and Morello, 1980). Vast tracts of forest were cleared for plantations. An exotic Old World monoculture species replaced thousands of acres of endemic flora. Where before there were only cart roads, railroads by 1890 (on the Atlantic side) and 1910 (on the Pacific side) were constructed to haul bananas to port and opened up new areas to development. More recently, cases of pesticide abuse on banana plantations have been reported

that cause soil sterility, health dangers, and other environmental problems (Weinberg, 1991). Yet, despite these problems and until 1950, Costa Rica remained mostly forested (Bozzoli de Wille 1986; Carriere, 1991).

The historical setting is now in place to understand what has happened to Costa Rica since 1950 and to appreciate the corresponding conservationist responses. What economist Osvaldo Sunkel (1980:18) refers to in Latin American history as "extra-regional interventions in search of natural resources" have economic and sociologic repercussions outside the scope of this paper. More germane is the experience of the banana industry in providing a base for intervention that would forever change the environmental face of Costa Rica.

The Agricultural Dilemma

A transformation has taken place from the natural way in which Costa Rican lives--a geographic transformation that has been out of his hands . . . [and] which instead has been dependent on the interests of the international market. This change has come to signify . . . how natural environmental balances have been broken, in terms of the optimal places to cultivate and the optimal places to protect watersheds and the flora and fauna of our country.

-Carlos Campos (1989:177)

The historical background of Costa Rican land use has led to a late twentieth century agricultural dilemma. The problem teeters between agro-development (for short-term economic prosperity) and environmental management (for long-term protection

of natural resources). The noted Latin American economist Raul Prebisch (1980:86) refers to this as a "technical ambivalence" where increased productivity has made an "enormous contribution to human welfare . . . but at the same time has had serious consequences for the biosphere." The Costa Rican case of this phenomenon since 1950 merits attention here.

Referred to as the "era of transformation" (Augelli, 1989: 82), the 1950's serve as a threshold because of the change experienced on the Costa Rican agricultural scene. Up until this point, the 'dessert crops' (coffee, bananas, and to a lesser extent sugar, cacao, and tobacco) dominated agroexport production. The post-war world economy, however, affected Costa Rican production. European and North American demand for Costa Rica's products fell after World War II because other tropical regions (i.e. Southeast Asia and Africa) began vigorously competing on the world market (Gómez and Savage, 1983). In the late 1940's and early 1950's African palm trees were introduced in Costa Rica (Hall, 1985) to begin a palm oil industry (for the manufacture of margarine and other products) as a way to diversify the agricultural economy. Like bananas, this exotic species thrived but required capital intensive management and thousands of acres cleared of native forest.

Another development affecting Costa Rica was the sharp decline in world coffee prices in 1958 (Hall, 1985). Coffee, long Costa Rica's sole means of economic leverage in the world import/export arena (Carcanholo, 1982), nevertheless was always

vulnerable to demand and at the mercy of foreign land speculators and financiers (Gligo and Morello, 1980). The government responded with its program of desarrollo hacia adentro (internal development) to promote manufacturing and encourage other agricultural industries to develop in Costa Rica.

One commodity that emerged in the 1960's and 70's was cattle. An exponentially growing North American market (strongly rooted in the need to supply fast-food restaurant chains with cheap hamburger) encouraged Central American countries to enter the beef business. Costa Rica leapt at the opportunity and by 1986 was the number one beef producing republic (eighty-nine million tons) in Central America (Leonard, 1987:216). The Leonard study (1987:152) reports that thirty-six million tons of this total were exported, ninety-six percent to the United States, which received more beef from Costa Rica than from any other Central American country. Another authority on the Costa Rican beef industry, George Guess (1979a:31), explains that this importation was based on U.S. Department of Agriculture fixed quotas for imported beef. In the late 1970's USDA policy allowed for a staggering 9.8 percent of all imported beef to be from relatively tiny Costa Rica and cattle raisers there worked hard to meet this annual challenge. By the 1980's, however, this "volatile . . . dependence on the United States" became hostage to a "fluctuating market" and to the whims of the U.S. Congress which established and changed (lowered) these import quotas (Place, 1985:295). This emphasis on exporting beef triggered a variety

of social and environmental impacts. One social impact was the significant drop in locally consumed beef (Guess, 1979b; Augelli, 1989). Simply stated, there was less meat available due to the push to raise cattle for export.* The powerful Cámara de Ganaderos (Cattlemen's Trade Association) lobby was extremely influential in gaining and maintaining governmental support for export production. The government provided such generous tax incentives and made high credit so available to ranchers that many dairy farmers switched to raising beef cattle. (Local prices for dairy products and beef climbed which lowered the overall standard of living for the nation [Place, 1985]). The number of cattle raised in Costa Rica tripled in three decades: from 607,850 head in 1950 to 2,050,350 head in 1985 (Augelli, 1989: 82).

This kind of cattle industry requires massive amounts of pasture. Not exactly known as a prairie republic, Costa Rica had to manufacture pastureland through systematic deforestation efforts. Hall (1985:87) and Carriere (1991:188) report that 19,600 square kilometers, or about one third of Costa Rica, is pasture. Julio Calvo (1990:355) has a similar estimate of thirty-four percent, and Barry (1991:73) goes so far as to state that it is more realistically forty percent. More importantly, Carriere and Calvo show that according to land use capability (LUC)

* The drop in available beef was especially noted by the McDonald's hamburger chain in Costa Rica which in 1977 had to import 140,000 pounds of meat a month from Guatemala (Guess, 1979a:31).

studies, only nine percent of Costa Rica is ecologically fit for pastureland, meaning that the other thirty-plus percent is damaged. Calvo (1990:355), a forester at Costa Rica's Institute of Technology, argues that this land is "suffering from erosion and loss of productivity owing to inappropriate management." Guess (1979b:45) suggests that because of erosion, pastureland "works towards its own obsolescence with tragic efficiency." Fifty-four percent of the damaged land has been identified by LUC as land that should be used for annual crops. Carriere (1991:187) suggests this underutilization is

not so much an ecological problem as an example of irrational economic use of a scarce resource . . . [and while] spillover into tropical forested areas is a devastating, though not accurately measured effect . . . a more irrational use of precious resources is difficult to imagine.

He further reveals that the rate of forest loss, four percent a year, is higher than anywhere in the Western Hemisphere, despite the more publicized information on deforestation from the Brazilian Amazon.* A more thorough investigation of deforestation follows, but suffice it to say that while cattle production at one point seemed like an economic salvation, it instead added to Costa Rica's agricultural dilemma. It lowered the per acre output of production, eliminated other crops, and increased the

* El Salvador, Haiti, and Cuba have even less percentage of remaining forest cover, but because not much forest is left, the rate of deforestation has slowed in those countries.

amount of food to be imported for local consumption (Guess, 1979b; Place, 1985). Taking land, estimated to be 40,000 to 80,000 hectares annually (Guess, 1979b:47), out of use for one commodity and putting it into use for another, that ended up being of short-term value only and with heavy environmental consequences, was part of Costa Rica's struggle to confront an economic reality. It also became a significant rallying call in the environmentalist community, and action was taken before all remaining forests were destroyed.

Agriculture in general cannot be ignored in Costa Rica. Agricultural land covers one half of Costa Rica (although only ten percent of the country is cultivated) and is the number one industry (Fournier, 1983:91, Leonard, 1987:197). Two thirds of the national economy revolves around agriculture with bananas being the number one crop (still controlled by foreign companies), followed by coffee, sugar, and of course beef (Barry, 1991:34; Carvajal, 1992:24). Cacao is still an export crop but is raised primarily on small farms. Food crops like rice, corn, beans (the principal source of protein for most Costa Ricans), fruits, vegetables, and palm oils are other secondary, but important, products (Hall, 1985). There are many small subsistence farms, but Hall's study reveals that about three fifths of all Costa Rican farms are either medium sized (that use family members and hired labor) or minifundias--farms that grow subsistence crops and some export products. Large estates make up only three percent of Costa Rican

agriculture, but "are the most extensively exploited and the least productive" (Hall, 1985:151). Cattle ranches employ "few and enrich even fewer" (McFarland et al., 1984:593) and take too much land out of more useful production. Nicolo Gligo (1980:392) points out that Costa Rica has had limited success with land reform but that it often has not been "compatible" with the government's emphasis on agricultural development.

In the 1970's and 80's Costa Rica participated in the Green Revolution. Hopes to stimulate the economy by producing more internationally marketable products (an economic theory known as 'comparative advantage') prompted more land to be cultivated. Thousands of acres were turned into citrus groves, African palm plantations, and ornamental plant fields. Visions of high yields necessitated the introduction of great quantities of chemical fertilizers and pesticides that these crops require. To cope with the debt crisis of the early 1980's, Costa Rica further accelerated these measures. The International Monetary Fund (IMF) insisted that Costa Rica produce more nontraditional crops like pineapples, flowers, and ornamental plants that could be sold in an ever growing world market to generate capital flow to help satisfy creditors (Weinberg, 1991). By the late 1980's these nontraditional crops accounted for thirty percent of all Costa Rican agro-exports (Barry, 1991:37).

While international lending organizations considered this a success, Costa Rica was experiencing other difficulties with 'comparative advantage'. Major multinational corporations (i.e.

Del Monte, United Brands, and Phillip Morris) were controlling a huge percentage of export products while not enough beans, rice, and corn were being planted to feed the nation (ibid.). "Frijoles sí, flores no" ("beans yes, flowers, no") became the rallying cry for a 1987 campesino protest, led by farmer-activist Carlos Campos, to protest these policies (Weinberg, 1991: 100). Warning against this agrochemical "dependency", Campos (1989:179) writes: "The reality is that we Costa Ricans are now dying, that we are destroying our soil, and from now on we should begin to demonstrate that, as farmers, it is necessary to present alternatives."

Gligo (1980:384) is more specific about the environmental harms of this kind of agricultural specialization. Referring to the abuse of chemical fertilizers and pesticides as a "modernizing artificialization of the ecosystem", he lists erosion of farm land, sedimentation of waterways, non-point pollution, salinization, increased flood potential, soil sterility, deforestation (and its resultant diminishment of biological diversity) as problems stemming from monocultural agriculture. Moreover, "altering the natural architecture" and modifying the "topologic composition" produces far fewer calories for the people than the natural ecosystems themselves (ibid.). The rate of infant mortality began to climb in the mid 1980's due to decreased nutrition from less available or overpriced commodities needed by poorer peoples. Susan Place (1985:295) concludes that "many campesinos are worse off than in 1950."

From 1950 to the 1980's, then, Costa Rica sustained vast environmental damage from its agricultural development. Craig McFarland et al. (1984:592) suggest that "Costa Rica was rapidly becoming a runaway train on a steep and curvy downhill grade" before policies started to change to preserve what environment was left. Much of that environment was formerly forested, which requires examination next before analysis of conservation efforts can be properly understood.

Deforestation

We have made very important steps for the preservation of our natural heritage . . . but at the same time we deplore the sad leadership we possess in destroying our forests. No country in Latin America has a higher rate of deforestation than ours; today less than five percent of the nation's dense forests exist outside of protected areas. Such a paradoxical situation constitutes a serious threat to the advanced successes of conservation.

- Oscar Arias Sánchez (1988:300)

The loss of forest deserves special attention here because of its impact on the environment and its importance to the development of a national environmental conscience. The rate of deforestation, as alluded to by former Costa Rican president Óscar Arias, is alarming. B. E. Lemus (1985:109) estimates that originally (before any humans lived there) 99.8 percent of Costa Rica was covered with forest. The trees there evolved by succession--the process whereby some species adapted, thrived, and when dead made way for other species to move in (Young, 1981). But by the 1980's

approximately sixty-five percent of Costa Rica was deforested (Fournier, 1981:153; Calvo, 1990:355). In the high development 1970's Costa Rica had the highest rate of deforestation in Central America, experiencing a twenty-nine percent forest loss in that decade alone (Leonard, 1987:119). In turn, this provided for seventeen percent of Costa Rica's land to be degraded (ibid.) with an estimated 680 million tons of soil a year being washed away due to loss of forest cover (Barry, 1991:73).

While much of this loss was due to agricultural crops and pasture, which increased by 250 percent from 1950 to 1984 (Augelli, 1989:88), the timber industry is also responsible for massive deforestation. In fact it was the timber industry which first opened up many forests for agricultural development by constructing roads into previously inaccessible areas and clearing land for fields. By the late 1980's there were 17,000 miles of roads in Costa Rica, more than in any other Central American nation (Leonard, 1987:212). What Lemus (1985:109) calls the "forest industrial complex" is big business timbering, most of which occurs on private land in Costa Rica. However, because of imprecise surveying efforts, poorly delineated boundaries, and underbudgeted enforcement measures, logging (and its resultant pasturing) has occurred inside protected areas as well (Weinberg, 1991). And instead of using a plan of selective cuttings in forest reserves, timber companies have been clearcutting large tracts of densely forested areas for short-term economic rewards. Two thirds of all harvested timber is consumed as fuel and much is wasted due to the

"deficiency of extractive methods and the lack of industries to use the poorer quality wood" (Hall, 1985:194). Such waste and non-sustainable harvests are fast resulting in a situation that by the year 2000 Costa Rica will have to import wood for domestic use (Calvo, 1990:355; Barry, 1991:2; Weinberg, 1991:114).

Along the roads made to haul timber out of the backcountry came squatters--poor settlers called precaristas--looking for land to farm in newly forested areas. Unlike most of Latin America, these colonizers came out of the interior of the country and migrated towards the coasts. The Costa Rican government, through its Institute of Agrarian Development (IDA), encouraged migration in the early 1960's to "improve" virgin "farm" land (Hein, 1989a: 276). In 1961 the Law of Lands and Colonization (similar to the Homestead Act in the United States) was enacted. It established a special agency to aid the precaristas and imposed sanctions on landowners retaining uncultivated acres. But while the majority of precaristas squatted on land designated as farm areas (Villa-real, 1983) they did not settle solely on private land. The environmental group Fundación Neotrópica (as cited in Carriere, 1991:188) reports that a staggering twenty-five percent of federally protected land (including wilderness areas) was invaded at one time or another. Crop land and cattle pastures were established before the government could react and in many cases before it even knew. Likewise, some precaristas (without permission from the landowners) occupied and attempted to farm plantation land belonging to foreign owners (Weinberg, 1991).

By the 1980's, colonization was becoming a significant economic, sociologic, and environmental problem.* The Weinberg study (1991:106) estimates that one sixth of all Costa Rican families were precaristas. Making a long-term, better living for their families, however, in many cases did not materialize. Cleared land and supplies were bought on credit. Interest rates and principal became difficult to pay when prices and demand on agricultural commodities dwindled. Price policies set far from where the campesinos worked dictated production needs without the squatters' knowing or ability to change crops (Barry, 1991). An even greater setback was erosion, occurring when land was cleared of cover and the topsoil and its nutrients would eventually be lost in run-offs during the rainy season. Crops could be grown for only three to five years when many peasant families were forced to sell out to large real estate firms who in turn sold the land to ranchers as pasture (which would last for only four to six years more

* Not all research shows precarismo to have a negative impact. Beatriz Villareal, in her authoritative work El precarismo rural en Costa Rica, maintains that in 1973 (near the height of the precarista period) the squatters represented only eight percent of the rural population. Daniel Janzen (1986b:82) argues that "squatters have never been a problem on government or private land under conspicuous use" and that at Guanacaste National Park (a preserve Janzen was instrumental in establishing) squatters would take only marginal land. Likewise, the OTS in 1984 began an environmental education program for squatters living near its La Selva biological station that was aimed at "treating them as friends and neighbors and not as invaders" (Brown, 1990:20). A similar approach is used at Monteverde. There, the World Wildlife Fund and the Canadian based Monteverde Conservation League sell tracts of land to precaristas for twenty-five dollars an acre to help them relocate away from endangered tropical rainforests (Dwyer, 1988).

before becoming completely degraded land). Carolyn Hall (1985: 113) summarizes the scenario:

In many regions colonized by peasant farmers, ecological conditions were unsuitable for continuous cultivation. Poor soils, steep slopes, or an excessively wet climate led to soil exhaustion, erosion, and reduced yields. Many colonists therefore moved to new frontiers . . . and many sold their land to speculators who were thereby able to accumulate much larger properties than those stipulated in the homesteading laws.

When farmlands became ranchlands displaced peasants were not absorbed into the cattle workforce. Guess (1979b:47) and Carriere (1991:191) show that where coffee production requires 130 working days per hectare per year (rice sixty and beans thirty-seven) cattle require only six. Advances in agricultural technology also translated into less need for field hands. With so little work to be found in the country (and what work there was paid poorly), thousands of precaristas had no other choice than to return to San José or other cities--the completion of the colonization cycle (Estrada, 1982). Guess (1979b:44) quantifies the impact of this cycle by maintaining that twenty-five percent of the rural population ($n = 150,000$) became "landless workers/farmers"--the highest percentage in Central America. Hence, an "important development contradiction for policy makers" emerged in the late 1970's when 90.3 percent of all land in production (reduced to eighty-two percent by 1985) for the cattle industry was accounting for only twelve percent of total agricultural exports and a small percentage of the GNP (Guess, 1979b:44; Place, 1985:294). Place (ibid.)

concludes then, that "the export beef boom actually appears to be underdeveloping rather than developing Costa Rica's economy." Likewise, "[it is] heightening tensions within the country and promoting future social and economic problems." Guess (1979b:48) contrasts the cattle industry with what it has displaced in the sustainable harvest of timber--resulting in a "\$4.68 million net loss in the economy in potentially marketable hardwood species." The cattle industry, he states, "has become a drag on the economy instead of its leading edge" (*ibid.*:49) and has concentrated the wealth with "landed elite" by squeezing out many small farmers.

The impact of deforestation on Costa Rica is indeed multifaceted. McFarland *et al.* (1984:593) cite not only the obvious loss of trees (and therefore timber) but also the loss of wildlife habitat (especially of threatened and endangered species), scenic value, watersheds (resulting in a significant reduction in hydro-power generating capability), and employment in many sectors of the economy. They state that until the

end of the 1960's, neither the government nor the general public in Costa Rica was conscious of a renewable resource problem--based on the belief that Costa Rica had more than enough resources and that no shortages would develop. . . . [They further believed] that basically the entire country was suitable for agriculture and livestock and that forests were only impediments to development and therefore deforestation was an 'improvement' to the land.

Carriere (1991:190) goes further to suggest that deforestation results in river silting (from cleared land erosion), disruption of fisheries and traditional fishing grounds, abnormal flood/drought

cycles, riverbank erosion, heavy soil compaction (from cattle), soil sterility, and an

overall loss of future economic opportunities based on extractive/sustainable use. The land may turn into a permanent desert or gradually regenerate its topsoil by natural means after one or two centuries, depending on the bioclimatic environment.

What Costa Ricans thought might be a "giant step towards modernization", John Augelli (1989:77) argues had "a minimum of socially desirable and environmentally adaptive components [resulting in] painful social and ecological costs."

It took this kind of harsh information for the government of Costa Rica to legislate against forest abuse. The Ley Forestal (Forest Law) of 1969 became a monumental turning point in Costa Rican environmental history. Article One proclaims:

This law establishes as an essential function of the State to guard the protection, exploitation, conservation and development of the forest resources of the country, in accordance with the principle of multiple use of natural, renewable resources. ("Costa Rica-Ley Forestal", 1969:908)

Conceived with the notion of 'multiple use' (a concept borrowed from the U.S. natural resources policy), the Ley Forestal placed all of Costa Rica's forests under the charge of the Ministry of Agriculture and Livestock (MAG). Article Two directs MAG to "conserve forest resources . . . combat soil erosion, control the exploitation of forest resources . . . [and] conserve wildlife" (ibid.) among other duties. Specifically for forest concerns and to be administered under the auspices of MAG, the General Forestry

Directorate (DGF) was established in Article Nine. Its functions include "to administer the forest heritage [defined in Article Eighteen to mean national parks, forests, preserves, and biological reserves], . . . [and] to give technical assistance to the timber industry" (*ibid.*:910). And, as will be discussed more in-depth later in this paper, the Ley Forestal established Costa Rica's first national park and set aside other 'protected' areas that would not be open to development.

The Forest Law of 1969, however, hardly slowed deforestation. In the decade following promulgation of this law, Costa Rica experienced a twenty-nine percent total forest loss! (Leonard, 1987:119). What happened? Luis Fournier (1981) points to a lack of long-range planning despite increased awareness of conservation needs. Other studies show how the law was not actively enforced. Hall (1985:122) explains that the Ley Forestal

stipulated that a permit must be obtained from the DGF before any timber can be cut from private or public lands . . . [but] the DGF lacks the funds and trained personnel to enforce the law.

While the DGF is supposed to have complete control over all timber cuts, it has been reported that roughly one half of all trees felled lack the proper permits (Hein, 1989a:277). Many thousands of trees are harvested in banned areas (Barry, 1991) and deforestation occurs on the perimeters of protected areas affecting their overall environmental integrity. Because funds are scarce, insufficient vigilance near protected zones opens the way for "ranching, slash-and-burn campesino farming, high-pesticide corporate

agriculture (such as banana plantations), or timber exploitation" on the borders of the parks and often extending into them (Weinberg, 1991:113).

The bleakness of the above scenario is only offset by changes occurring in Costa Rica. Squatter colonization persists but has declined dramatically (albeit for more economic than environmental reasons) since the mid-1970's (Villareal, 1983; Hall, 1985). In 1977 the Ley de Reforestación (Reforestation Law) was passed which was the government's "first step toward opposing the traditional idea of forests as tierras incultas" (uncultivated, read: useless, lands) (Hall, 1985:194). It repealed the tax on uncultivated farmland and established tax incentives, loan assistance, and technological help for reforestation efforts. It is an expensive project that has not been totally successful yet on a nationwide basis, but has great economic potential for providing a sustainable wood products industry. One project near Turrialba called Programa de Diversificación has been successful in repopulating trees and employs the services of local small-scale foresters (Fournier, 1981). Another study (Lemus, 1985) lists the advantages of reforestation which include guaranteed watersheds, hydro-power, wildlife habitat, erosion control, and the diversification of local economies. Currently, however, his study suggests that there is a lack of long-term financial investment and technology for reforestation to become more successful and that much of the land needed is located in private holdings.

Hall's study (1985:194) points out that many thousands of reforested acres have become plantations of single tree species and therefore "insignificant in relation to the magnitude of the ecological problem they are intended to solve."

As powerful a problem as deforestation is in Costa Rica, in many ways it did help wake up a nation to its environmental responsibilities. The voices of many started to become louder for the more rational conservation of natural resources. Lobbying became intensive for the designation of more and more national parks and protected areas. McFarland et al. (1984:593) posit that

the problem was to begin from essentially zero and gradually select, establish, plan and implement a protected area system which could counteract the negative environmental trends and then form part of the solution to the problems being confronted.

Part of that solution meant that the government would have to take a more active position in legislating protection and funding enforcement. Bill Weinberg (1991) reports that recent steps have been taken to crack down on wilderness exploitation. The Rural Guard is conducting spot checks for illegally cut logs (often hidden in produce trucks). At the urging of the DGF and despite great uproar from the timber industry, the government declared a state of emergency concerning the deforestation crisis. The DGF can now suspend permits to cut trees outside of private plantations and can prohibit the export of unfinished wood products. Likewise, funds have been specifically earmarked for the enforcement of these measures.

The government also has encouraged sustainable development of forest resources (to include agriculture, silviculture, and tourism) to protect its tropical forests. Programs in environmental education have assisted this effort. According to Weinberg's study (1991:116), 'sustainable development' is

virtually a household term among educated Costa Ricans today. One example of desarrollo sostenido currently very popular in Costa Rica is nature tourism . . . [by which] Costa Rica's remaining pristine rainforests, beaches, and volcanoes can be made to 'pay their way' rather than being sacrificed on the altar of foreign debts.

None of these successes occurred spontaneously. Environmental reforms, reforestation, national park development, and ecological education did not occur in Costa Rica without the will of the Costa Ricans and without the diligence of a people with an environmental conscience. The result can be seen in the history of Costa Rican conservation, as will be discussed in the subsequent chapter.

IV. The Conservationist Response

An Overview of the Costa Rican National Park Experience

. . . the national parks belong to all Costa Ricans equally, and therefore they have the right to enjoy them . . . but also the duty to protect them.

- Mario Boza (1984:7)

What do the words "model", "example", "beacon", "influence", "prototype", "the ideal" and "wave of the future" have in common? Answer: all have been repeatedly used to describe Costa Rica's national park system. The descriptions are used to refer to the parks' diversity, number, size, management schemes, beauty, and quickness in being established. The 1970 United Nations List of National Parks and Equivalent Reserves (IUCN, 1971) lists no national parks or protected areas in Costa Rica. Six short years later, however, a different U.N. study called A Manual for National Parks and Planning (FAO, 1976) refers to Costa Rica as a model on how to preserve natural areas and how to create master plans to protect flora and fauna. By 1980 Costa Rica had more protected areas and more personnel working on conservation issues than any other Central American nation (Barborak, 1982) and a greater percentage of land designated as national parks or reserves than the United States (Young, 1981:29). The figures today speak for themselves: twenty-five percent of Costa Rica is federally protected land, eleven percent of which is national parks and fourteen percent divided among biological reserves, national forests, national wildlife refuges, and indigenous Indian preserves (Fundación Neotrópica and Conservation International, 1988:4; Barry, 1991:73;

Ugalde, personal communication, 1992). Over eleven percent of the total designated area is under "strict" protection and the remainder is managed for different degrees of multiple use development (i.e. tourism, logging, etc.) (Fundación Neotrópica and Conservation International, ibid.). The history of how this happened in such a short and financially stressful period of time will be discussed below.

A few words concerning definitions are important first. Costa Rica's protected areas are divided into three management types. Type One is "strict" protection (national parks, biological reserves, national monuments, natural reserves, and wildlife refuges) with the objectives "to preserve species (and) to reduce human intervention in environments and ecological processes." Type Two includes forest reserves and protected zones whose objective is "partially to protect the biological diversity as they are open to exploitation of resources under certain conditions." And Type Three is Indian reserves which are for "the conservation of cultures and their environments and the protection of life systems in these communities and the way natural resources are used." Type One protected areas also include archaeological or historically significant sites (e.g. the prehistoric Indian ruins at Guayabo National Monument or the Filibuster War memorial at Santa Rosa National Park) and Type Two forest reserves allow limited logging but also were established to protect important watersheds, wildlife, and forage (McFarland et al., 1984; Bonilla, 1985). There are twenty-six Type Three Indian reserves.

Article Seventy-four of the Forest Law (1969:917) legally defines "national parks" as:

those regions or areas of historic importance that are set off by boundaries determined by executive decree and that for their scenic beauty or the national or international importance of their wildlife are to be set aside for the recreation and education of the public, for tourism or for scientific research.

According to Boza and Mendoza (1981:27), national monuments are smaller areas (1000 or fewer hectares), have less diversity or less natural and historic value than national parks, or are areas protecting a specific resource. Biological reserves are "areas unaltered by human activity that contain ecosystems and plant and animal species of scientific value and in which the ecological processes follow a spontaneous course of action" (*ibid.*). Bonilla (1985:63) calls the forest reserves (or national forests) "the lungs of the cities" and explains that they are managed far more by the concept of 'multiple use' than are national parks and include logging and recreation as high management objectives. Meanwhile, wildlife refuges are

area[s] where it is necessary to adopt protection measures to perpetuate the existence of one or various species or various populations of species of resident or migratorial fauna [marine or terrestrial] that are of national, regional, or international importance. The area does not have to be totally natural and it may require certain habitat modifications to create the optimal conditions for the survival of the species (*ibid.*:64).

The importance of the national parks (and other protected areas) is multi-dimensional. In the large sense, preserving the

"natural and cultural heritage" of Costa Rica (Boza, 1984:6) seems like the obvious mission of the national parks, but, in a country with such broad diversity, that is no small task. Costa Rica is responding to the challenge, however, by developing parks or preserves in all of its identified geographic zones (with the exception of the wet lowlands montane forest which, according to Boza, has no representative natural or undeveloped areas remaining). The park service has identified five management types of national parks to accomplish this goal: historical and archaeological, mountainous and volcanic, dryland forests, rainforests, and underground and submarine parks (Boza and Mendoza, 1981:15).

The scientific value of this preservation system is probably immeasurable. Guanacaste and Santa Rosa national parks, for example, are the only protected tropical dry forests in the world and Poás Volcano is one of the world's few remaining active volcanoes with year-round access for scientific study (Boza, 1978). Likewise, maintaining as natural a state as possible for tropical plant and animal communities represents an "endless fountain of educational and research material for all age levels" (Fournier, 1983:92). It also is a "deposit of genetic material" (ibid.) that has scientific, medical, and economic potential (Lovejoy, 1982; Fournier, 1985). The genetic value of species protection in habitat protected by Costa Rica's parks and preserves (what Fournier [ibid.] refers to as "open-air laboratories") may keep the country in the scientific limelight for decades to come. Furthermore, Bozzoli (1986:8) argues that in the next fifty years these

protected areas may be the only natural territories left in the entire country if development continues at its present rate.

That Costa Rica realized this threat and acted quickly to save as much as it could in all of its representative geographic zones (save the one listed) exemplifies the environmental awareness and will of the people. It also serves as a regional model for ecologically troubled Central America:

The subject of national parks is gaining in importance in other Central American countries due, to a certain extent, to the influence of Costa Rica . . . for example, the first Central American meeting on Management of Cultural and Natural Resources was held in San José to analyze, among other subjects, the zones proposed for a Central American system of national parks . . . (Boza and Mendoza, 1981:26).

And former Costa Rican president Óscar Arias (1988:30) takes the importance of the parks and preserves one step farther to include a global responsibility:

Our system of national parks and wildlife areas protects individual ecosystems that are the paradigm of the extraordinary natural variety of which we are guardians. This is of vital importance not only for present and future generations of Costa Ricans, but for all humanity.

Legislating Preservation: The Development of National Parks and Protected Areas

The Costa Rican national park system gives some hope that the marvelously diverse communities of tropical organisms will be preserved for future generations to enjoy and for future scientists to study.

- L. D. Gómez and Jay Savage (1988:10)

The system which gave rise to these hopes evolved in a unique way that deserves explanation here. It was not a spontaneous

occurrence. While there were no actual national parks in Costa Rica until 1970, the concept of protecting areas goes back to 1863. It was then that the government of Costa Rica set aside a tract of forest on both sides of the Camino del Norte (Northern Road) to be excluded from cuts (Boza and Mendoza, 1981; Vaughan, 1981). In 1913 Poás Volcano was classified as 'protected' and a 200 meter swath of forest inland from Costa Rica's coasts and a 500 meter swath along river banks became the first 'national forests' (ibid.). Law Number Thirteen of January 1939 added certain montane regions to these protected forests but was really more like a philosophical resolution because it included no exact delineations or enforcement clauses. When Costa Rica's segment of the Pan American Highway was constructed in 1943 biologists Charles Lankester and Mariano Montealegre proposed the idea of protecting as a "national park" a region on both sides of the road that contained the "world's largest oaks" (Bonilla, 1985:59). Law Number 197 of 1945 designated 2000 meters on both sides of the highway as a 'national park' (the first time such a term was used in Costa Rican legislation) and stipulated that no forest exploration would occur in this area. Unfortunately, the law was never put into effect (Boza and Mendoza, 1981; Bonilla, 1985).

A 1949 decree established a Forest Council to inventory forest resources and to protect forests from diseases and fires and in 1953 the administration of José Figueres commissioned the Ley Orgánica (Organic Law). This law established a commission within the Instituto Costarricense de Turismo (ICT) to investigate other

nations' national park systems. Its members visited Peru, Mexico, Argentina, and the United States to seek ways to develop a park system in Costa Rica. Economic considerations at the time, however, thwarted implementation (ibid.). A 1958 ICT study addressed where national parks should be located, further emphasizing volcanoes and oak forests, but it was not until 1966 that the first protected area was actually created--Santa Rosa National Monument (more as a way to honor the Costa Rican success in the 1856 Filibuster War than to preserve the tropical dry forest in which it is located).

The turning point, however, came in 1969 with the passage of the Ley Forestal. The Forest Law established the framework to develop national parks, forest reserves, and the infrastructure to administer them. The law was the result of a long time effort of many people to make the government of Costa Rica recognize its obligation to conserve natural resources in the face of such rapid development and forest destruction. Luis Fournier (as quoted in the introduction to Vaughan, 1981:15) adds:

our Forest Law . . . initiated the creation of the national parks as one of the most appropriate ways to accomplish a delicate conservationist mission. This law and the enthusiasm of a group of Costa Rican scientists, with the aid of many foreigners, were the basic elements for the development of a system that is not only the pride of Costa Ricans, but whose fame has also gone beyond our borders.

One of those scientists who was very instrumental in seeing the Forest Law passed was Guillermo Iglesias. Iglesias was Secretary

of MAG (Ministry of Agriculture and Livestock) in the administration of President José Trejos in the late 1960's. Concerned over a lack of government guidelines regarding the rational use of forest resources, Iglesias formed a commission of professional conservationists to draft a forest law. Two years later the legislative Assembly of Costa Rica passed Law Number 4465, the Ley Forestal, which was the result of the commission's work and which, according to Luis Fournier (1991:62) who was a commission member, became a "transcendental step in forming the rational use of Costa Rica's forests."

Chapter Six of the Forest Law (Articles Seventy-four through Seventy-eight) deals specifically with one of the rational uses identified by the commission: national parks. Not only did this section define national parks but also placed them under the auspices of a Forestry Directorate (DGF) which was to become a new division of MAG.* (The DGF was established four months after passage of the law.) Chapter Six also specified that once a park was created, no part of it could be segregated for any other uses without Legislative Assembly approval and that the DGF and ICT would define these norms ("Costa Rica-Ley Forestal", 1969:916).

* A pertinent study of this type of environmental legislation (Salcedo and Leyton, 1980) suggests that these kinds of bureaucratic divisions were typical of the conservation laws of many Latin American nations. 'Public utility' and 'national interests' were reasons that forest codes often were administered by development agencies.

To head the new National Park Department (as it then was called) in the DGF, a former CATIE student and recent Master's in Science graduate from UCR's School of Agronomy was hired in 1970. This individual, whose 1968 thesis was a management plan for the proposed Poás Volcano National Park, was Mario Boza. Fournier (1991) recounts how Boza worked with great enthusiasm in this newly created position to identify needs and to detail management plans for national parks. Boza (1978:2) states that it was the dangerous environmental brink at which Costa Rica found itself that spurred the need for this early work:

. . . a series of environmental problems like deforestation, poaching, erosion and pollution seriously threatened the conservation of the cultural and natural heritage of the nation. To preserve at least representations of this heritage, beginning in 1970 with the creation of the National Park Service, an active program was initiated for the establishment, development and protection of national parks and equivalent reserves.

The way national parks were to be designated is also spelled out in the Forest Law. Article Seventy-four mandates that parks be formed by executive decree (by the president of Costa Rica) with the advice of a National Forest Council, (made up of delegates from various government agencies like MAG, ICT, the agencies responsible for electricity, commerce, and land use, and UCR). Funding is delineated in Article Thirty-four which establishes a Forest Fund to generate budgets for the DGF and its park service and to channel donations to the proper agencies. Article Seventy-eight states that additional funds needed will come out of the

Costa Rican general revenue ("Costa Rica-Ley Forestal", 1969: 910, 918). McFarland et al. (1984:593) claim that this system was designed to make "the State responsible for ensuring the protection, proper use, conservation, and development" of national parks and "to solve the problem of natural resource misallocation and misuse."

The first area officially to be protected under the new guidelines of the Forest Law was Cahuita National Monument in September of 1970 (Vaughan, 1981; Boza, 1984). Cahuita, which was changed to a national park in 1980 (Boza, 1984), is located on Costa Rica's extreme southeast Caribbean coast and includes tropical forest, miles of pristine white sand beaches, and a 600 hectare coral reef that is the only well preserved reef on Costa Rica's Caribbean side. That same month a small part of what would in 1975 become Tortuguero National Park was declared protected for green sea turtle nesting grounds on Costa Rica's northern Caribbean shores. In January 1971, Poás Volcano was declared a pilot national park (Barborak, 1982) and then became Costa Rica's first official national park (Boza, 1974; Vaughan, 1981; Fournier, 1983). Two months later, which happened to be the 115th anniversary of the filibuster battle, Santa Rosa's status was changed from "monument" to "national park" to become Costa Rica's second national park (ibid.). Mario Boza explains that these first two parks were recommended by Gerardo Budowski and Kenton R. Miller--associates at CATIE who both went on to become IUCN directors. Speaking to

the Second World Conference on National Parks in 1972, Boza (1974: 185) stated that

the common feature of these two parks is that they are attractive both to the people of the country and to visitors from abroad, are of easy access, and have great national significance, conditions which made their establishment possible without opposition from anyone.*

He went on to relate that the strategy of Costa Rica's park service in those early days was to start small and protect well what was designated rather than to have too many parks to manage all at once. Success in early parks would hopefully set off a chain reaction of public support to conserve other areas in the country (*ibid.*). The combination of establishing parks that were to be conserved for their natural environmental qualities as well as for their historical value was applauded by Fournier (1981:92) who wrote that "it resulted in an adequate decision with a double function: to protect the cultural and natural heritage of the nation as well as to provide public recreational services."

Other national parks and reserves followed in the early 1970's: Manuel Antonio NP on the Pacific coast (1972), Rincón de la Vieja NP in the northwestern mountains (1973), Guayabo Biological Reserve--an island rock in the Gulf of Nicoya that is a haven for shore birds (1973, changed to a national monument in 1982),

* A great deal of public support was garnered for Santa Rosa because much of the land formerly had been owned by Nicaraguan dictator Anastasio Somoza--an individual who enjoyed very little popularity in democratic Costa Rica.

and Barra Honda NP--a series of caverns on the Nicoya Peninsula (1974).*

All of these national parks were designated during the 1970-74 administration of President José Figueres Ferrer. While it perhaps is an impressive list for a small country with a new national parks system, the designations did not come without the determination and hard work of various individuals inside and outside the government. Mario Boza as head of the National Park Service worked tenaciously to protect areas. He had the support of many fellow biologists, geographers, and social scientists at Costa Rica's universities. Professional associations as well as mountain climbing and speleological clubs, environmental groups, garden societies, and youth groups all "played very important roles in the development of these wilderness areas" (Bonilla, 1985:61). International organizations like the IUCN, World Wildlife Fund, Nature Conservancy, Sierra Club and European environmental groups all greatly assisted with financial and technical assistance. Research organizations in Costa Rica like the OTS, CATIE, and TSC were also invaluable partners in support of protecting areas.

The literature is consistent in pointing to one individual in particular who was extremely influential in national park development during the Figueres administration: the president's wife, Karen Olsen de Figueres. Similar to many first ladies in the

* Irazú Volcano in central Costa Rica enjoyed an earlier protected status in 1955 but did not come under the authority of the National Park Service until the 1970's.

United States, Doña Karen (as she is affectionately known in Costa Rica) took on a special cause or avocation during her husband's presidency. The cause she chose was protecting the environment and establishing national parks (Boza, 1974; Boza and Mendoza, 1981; Young, 1981; Bonilla, 1985). Allen Young (1981:29) goes so far as to say the national park system was "rooted" in the efforts of Mrs. Figueres, and Boza and Mendoza (1981:25), and Bonilla (1985:61) refer to her as the "godmother of the parks program". At the 1972 World Conference on National Parks in Jackson, Wyoming, Costa Rica's lone delegate Mario Boza (1974:189) (only two years into his position as head of the national park service) spoke at length regarding the importance of Mrs. Figueres:

The best collaborator . . . a park program can have is the First Lady of the Republic. Costa Rica's first lady Señora Karen de Figueres has not only given her full support to the theme of conserving the natural patrimony of the country, but has gone much further by proposing a large scale program--now before the Legislative Assembly--for establishing and funding a system . . . that would comprise no less than sixteen new parks. What was of particular importance to us is that [she] was in the position to give practical help in everything. Through the president, she can get proposals for new legislation . . . she can ensure the support of agency heads and legislators belonging to her party, seek certain kinds of international aid which can only be obtained by approach at the presidential level, etc. In short, it was only after Doña Karen began to help us directly that our park program began to make rapid progress.

Likewise, she joined environmental groups and served as member of several conservation commissions.

What is not discussed in the literature, however, is why Mrs. Figueres became so personally involved. In an interview conducted for research on this thesis, Doña Karen explained that she became motivated to work on environmental issues out of a religious, "conscience oriented" calling. "Helping people become conscious of what God has given us, of what brotherhood means . . . and of our responsibility as stewards of the land," she remarked, was "so essential to me." Continuing, she stated, "each person's value and responsibility [towards the land] brings unity and balance . . . and instills a conscience of what we are in Costa Rica." She also mentioned that her interest in the environment was an extension of her educational and professional background as a sociologist. This discipline had helped her understand how the "development [of a country] is not logical without considering long-range values." "Too much thinking today," she explained, "is short-term or for right now."

Born in Denmark, raised in the United States, but "1000 percent Costa Rican" most of her adult life, Karen Olsen de Figueres viewed her role as first lady to be a catalyst for national park protection. What initially sparked her interest, however, was less philosophical and more out of anger. In the interview, Mrs. Figueres related how the first two years of her husband's presidency coincided with the first two years of the Ley Forestal. Nonetheless, environmentalists were becoming frustrated at the apparent lack of support the agency in charge of administering it (MAG) was showing for conservation issues. More specifically,

according to Doña Karen, it became known that the director of MAG (who was appointed by her husband but whose name she requested not be printed in this paper) was running and grazing his own personal cattle on property within the borders of Santa Rosa National Park (a direct violation of Forest Law policy). For Doña Karen "this incensed me! . . . and it became the turning point for me to get involved . . ." Admitting that people like Mario Boza and Álvaro Ugalde (within MAG) and activists like Alexander Bonilla all knew what was going on, she related how frustrated they were in not knowing how to handle the scandal. "It gave me the green light" to try to make a difference, she stated, and hopefully "gave the green light to like-minded people to get involved." When asked about the political ramifications of exposing this situation, Mrs. Figueres responded that she "was born to serve . . . [and that] political positions do not belong to us, they are only loaned--they are not fulfilled just by getting votes." Henceforward, as mentioned, she lobbied for national parks, funding, and international assistance in ecological issues.

Twenty years later, Karen Olsen de Figueres is an elected at-large member of the Costa Rican Legislative Assembly and is active in environmental policy-making. She sees her work today as trying to attain "consistent" government attention to rational and sustainable use of the country's natural resources. Recent (1992) legislation she is working to pass concerns preventing the Isla del Coco (Coco Island off the Pacific Coast) from tarnishing its national park status by becoming a casino island for which many

people with "right now" attitudes and "short-term economic hopes" are pushing. Likewise, she has introduced legislation banning the importation of foreign toxic waste to be dumped in Costa Rica, is pushing for a Western Hemisphere "green belt" to run from Canada to Chile (which would "cause a political and environmental unity" across the Americas), and would like to see San Lucas Island become a maritime research station for the University of Costa Rica.

Staffing and training personnel to work in the early national parks became a challenge in the 1970's. A nationwide lack of trained park wardens, wildlife managers, and foresters prompted the national park service to solicit international assistance. The U.S. Peace Corps responded by sending volunteer conservationists to help develop national parks and to train personnel. Assistance also came from the British Volunteer Services Organization, the FAO (the U.N. Food and Agriculture Organization which had a forestry division), the Caribbean Conservation Corporation (especially for Tortuguero), international environmental groups, and the National Youth Movement of Costa Rica which sponsored several work camps (Boza, 1974; Barborak, 1982). One Peace Corps volunteer to Costa Rica in the early 1980's said that staff training and trail construction and maintenance were only part of his duties there (Koepsel, personal communication 1992). He stated that lobbying for national park support and organizing trips into protected areas for residents who lived near them were essential public relations responsibilities he had. Mario Boza (1974) commented that Peace Corps volunteers were also used to write

newspaper press releases to keep environmental news up to date. Funding for these programs came from grants from U.S. Aid for International Development (AID), the Rockefeller Brothers Fund (especially for funding park planning), and contributions from environmental organizations (ibid.).

Expansion of the national parks continued during the administration of the next president, Daniel Oduber Quirós (1974-78). With his selection of Rodolfo Quirós as new director of MAG, the Oduber administration decided to give priority to programs dedicated "to the conservation of nature and renewable natural resources as a way of contributing to the country's socio-economic development" (Boza and Mendoza, 1981:25). Young (1981:29) states that the Oduber years of 1974-78 "nurtured and developed" the park system. President Oduber designated large national parks like Tortuguero, Corcovado, Chirripó, and Braulio Carrillo. He amplified Santa Rosa NP, developed Rincón de la Vieja NP, established Dr. Rafael Lucas Rodríguez National Wildlife Refuge, and Isla del Cano and Hitoy-Cerere biological reserves (Boza, 1984; Bonilla, 1985). Oduber and Quirós worked to increase the budget of the park service from \$600,000 in 1976 to \$1,750,000 in 1978 (Boza and Mendoza, 1981:25). They continued the efforts to attain international loans for park expansion and for environmental education programs. Most importantly, it was during this administration that the status of the national park service was increased. First, in 1975 the National Parks Department of the DGF was elevated from its "subdirectorate" status to a "general directorate"

with greater individual autonomy, and then in 1977, it was completely separated from the DGF and became the SPN (Servicio de Parques Nacionales)--its own division within MAG (IUCN, 1982; Fournier, 1991). This change of status was more than just bureaucratic shuffling; it provided the freedom for the SPN to expropriate land for parks, set entrance fees, make recommendations for new parks, and generally expand its services with fewer hierarchical hurdles to surpass (IUCN, 1982). For his efforts in preserving endangered natural habitat, Daniel Oduber received the "coveted" Schweitzer Award from the World Wildlife Fund (Young, ibid.).

"The first president in the history of the country who visited a national park" however, was Rodrigo Carazo Odio (1978-82) (Boza and Mendoza, ibid.). Carazo, who claims his interest in the environment stems from an Arbor Day experience he had as a college student (personal communication, 1992), was committed to saving as much of Costa Rica's natural resources as possible. At the beginning of his administration in 1978 there were 182,000 hectares of protected land (or 3.5 percent of the country). At the end of his term in 1982 there were 418,000 hectares protected (8.3 percent of the country)--for a net increase of 4.7 percent (Carazo, 1989:479). Some of the new areas designated included Palo Verde, Isla del Coco, and La Amistad national parks, Isla Bolaños National Wildlife Refuge, and Carara Biological Reserve. The International Park of Friendship (La Amistad) was established in 1982 as a symbol of peace between Costa Rica and Panama on whose border it adjoins. The first "international park" in

Central America and the first area to be declared a World Biosphere Reserve by UNESCO in the Central American or Caribbean region, La Amistad is also Costa Rica's largest protected area and the "pride of the nation" (ibid.). Carazo was pleased to play a role in this historic undertaking and remarked that

Costa Rica had thus brought forward, with great effort, a fundamental wealth for preserving the planet and humanity . . . and assumed the position to challenge other countries of the world to conserve the human habitat. (ibid.)

In a research interview in 1992, Carazo mentioned that he was also particularly glad to have had a hand in protecting Isla del Coco NP "as a gift to mankind." Trumped up stories of buried pirate treasures were bringing in treasure hunters and threatening the overall integrity of the island (home to several endemic shore bird and plant species that will not live on Costa Rica's mainland) before Carazo designated it a national park. The Carazo administration is also credited with expanding existing parks and preserves.* According to Boza (1984) large sections of land were -----

* An unfortunate exception was the Palo Verde NP scandal. Created by Carazo in May 1980 with 9450 hectares, in July of 1981 Carazo suddenly reduced the park by over 7000 hectares--a move that was defiant of Article Seventy-six of the Ley Forestal and which surprised and infuriated SPN, environmental groups, and many Costa Ricans (Bonilla, 1985; Koepsel, 1992). Soon national and international opinion rose against the president and the environmental group ASCONA filed suit. Attorneys for the SPN and ASCONA wrote Carazo advising him of impending litigation. Carazo responded in a letter to Alexander Bonilla, conservation chairman for ASCONA, saying that the land was private and had never been legally expropriated (Bonilla, 1985). Wondering why Palo Verde had been singled out when other parks had private inlets, the suit was pursued and ASCONA won. "An interminable list" (ibid.) of telegrams, phone calls, and letters from legislators, professors, NGO's, and enraged citizens (including ex-president Oduber) supported ASCONA's cause.

added to Santa Rosa, Corcovado, Tortuguero, and Braulio Carrillo national parks, Isla del Coco Biological Reserve, and Guayabó National Monument to enhance preservation of their biodiversity. The Carazo years were also marked by a significant reduction in precarista invasions. During the Oduber presidency precarismo reached its greatest numbers but was more than halved during Carazo's term (Villareal, 1983).

It was also at this time that the way parks were being managed changed directions. Early parks were managed under the guidelines of a 'Master Plan' but were inflexible to the changing needs of a park (Barborak, 1982). By the 1980's a 'Management Plan', which is an individual strategy or planning system, was written for each protected area (Vaughan, 1981). These plans start with a philosophical statement of park objectives, detail resources and how they will be permitted for public use, and show how resources will be conserved for long-range use. Plans must be printed and distributed, include resource inventories, have management programs for 'integrated development', discuss zoning and borders, and have a mechanism in place to evaluate and revise plans when necessary (ibid.). The Peace Corps, SPN, FAO, UNESCO, and other groups and individuals have all written or assisted in the writing of various management plans.

At the end of the Carazo period, SPN director Murray Silberman (1982:149) challenged Costa Rica with the following words:

. . . we should not fool ourselves supposing that the mere creation of a national parks system that has gained much applause, respect and admiration from abroad, is the end of the road in this field . . . We should continue forward creating more parks and other reserves . . . but we should remember at the same time that the hardest and most difficult work lies ahead. We have been constructing the fort during these first ten years, but now we have to prepare the troops adequately for tomorrow's most important victory.

The new administrations of Luis Monge and Óscar Arias in the last eight years of the decade tried to follow this advice. New parks and preserves were established. While research is scant on environmental progress during the Monge years, the Arias administration dealt with the concept of "sustainable use" (Arias, 1988) and focused attention on the northwestern most province of Guanacaste. There, biologist Daniel Janzen was promoting a different type of conservation technique: tropical restoration.

Guanacaste Province is characterized by tropical dry forest. This particular life zone formerly covered most of the west coast of Mexico and Central America but only remains today in legally protected areas---Santa Rosa and Guanacaste national parks (and several smaller reserves) in Costa Rica and four small preserves in other countries (Janzen, 1986b). Because the life zone was practically at the brink of extinction, (only 0.08 percent of its original 550,000 square kilometers remaining due to uncontrolled agricultural development) (*ibid.*:9) Janzen was motivated to try to protect what was left and recreate dry forest topography through management manipulation. Believed to be the first place

in the tropical world where a habitat was attempted to be restored to its original state, Janzen's goal was to

have a management focus designed to integrate the park itself into Costa Rican local and national society as a major new cultural resource in an area that is agriculturally rich but culturally deprived. [It] will be large enough to maintain healthy populations of all animals, plants and habitats that are known to have originally occupied the site, and to contain enough habitat replication to allow intensive use of some areas by visitors and researchers . . . The park will have a variety of ecological values such as gene and seed banks for dry forest plants and animals, watershed protection, reforestation examples and technology, ecotourism and conventional tourism. (ibid.)

Guanacaste NP's management plan incorporated intensive fire control, reforestation, land acquisition, a ban on hunting, and, unique to this national park, grass control by cattle grazing and tree seed dispersal by wild and domestic animals (ibid.). The park was designated in the late 1980's by Arias and abuts Santa Rosa NP to form a 'mega-park' of tropical dry forest.* One study (Barry, 1991:75), however, reveals that because Janzen enjoyed such "power in shaping government conservation policy" some SPN employees grew to resent his actions. Janzen now spends half of the year in Guanacaste and half teaching at the University of Pennsylvania.

* Before the park was established, Janzen answered his own hypothetical question of what would happen if it were not: "We retreat to Santa Rosa (the Murciélagos area will be roasted off the map by the wildfires) and carry out all of the goals for Guanacaste NP on an inferior scale and in a gradually decomposing habitat. All of the inventory and other biological studies for Guanacaste NP will still be priceless as salvage biology, and at least tell future generations what they lost." (Janzen, 1986b:81)

Trends for the 1990's include expansion of this 'mega-park' experience. According to Barry (1991) plans are in the works to consolidate over twenty smaller parks and preserves into seven large units similar to the Guanacaste/Santa Rosa model. The UNESCO 'biosphere reserves' (i.e. La Amistad NP and Braulio Carrillo NP/OTS' La Selva) are also contemporary ideas for holistic park management. Janzen however, in his article "The Evolutionary Biology of National Parks" (1989:110), warns against such changes in park nomenclature. He argues that 'biosphere reserves' rely too heavily on controlled management while 'national parks' continue to attempt being "pristine biological portraits" and

by giving these parks (a) new name . . . as they evolve, the administration runs the risk of abandoning a significant part of the substantial body of social approval already accumulated in the public and governmental mind for any entity called a national park . . . We simply cannot afford to have two species of wildlands conserved for their biodiversity—one being static national parks and the other socially dynamic biosphere reserves.

Luis Fournier (1981) actively recommends the development of small forest reserves to be part of the national parks system. He maintains that small, species specific management units should be emphasized to maintain population examples of flora and fauna. One such area that may be developed for habitat preservation of various species of monkeys and the coatimundi (Nasua narica) is near Moctezuma on the Nicoya Peninsula. Land owned by Karen Mogensen, Danish immigrant to Costa Rica in the early 1960's,*

* Andre Øersted, Karen Olsen de Figueres, and Karen Mogensen round out an interesting Danish/Costa Rican environmentalist connection.

and which was formerly co-managed as a wildlife safehaven with her Swedish companion, the late Olof Wessberg, may be donated soon to the SPN as a small preserve (Weinberg, 1991).*

Small or large, protecting buffer zones around the national parks or preserves is becoming another conservationist ideal of the 1990's. UCR professor Sergio Salas (1982:28) advocated "park ecosystem" protection--not just park protection itself. Daniel Janzen (1986a:302) refers to this concept as "edge biology" and advises that protecting up to five kilometers depth surrounding parks is essential to the natural integrity of the parks themselves. Without managing the buffer zone of Santa Rosa effectively, for example, the upcoming oak reforestation efforts there will have "as much chance to influence the overall climate of the park [to improve environmental conditions] as [would] an ice cube" (*ibid.*). Tom Barry (1991:75) claims that "another trend that distinguishes environmental protection in Costa Rica is how the government is integrating people who live within or on the borders of protected areas into park planning and development." The

* Weinberg (1991:108) believes that the "programme for wilderness preservation began in the 1960's" with Mogensen and Wessberg. He relates how when they settled on the southern tip of Nicoya Peninsula they were dismayed at the deforestation rapidly encroaching their land. Through intense lobbying and letter writing for several years they were able to convince the government to declare Cabo Blanco an 'absolute nature reserve' in 1963 (Boza, 1984). This did not, however, stop the destruction there. One 'warden' killed off the last ten grey spider monkeys (*Ateles* spp.) in the world that lived at Cabo Blanco. The government thereupon gave Wessberg the authority to hire future game wardens and asked him to be a consultant for the preservation of Corcovado NP. While there, he was killed with a machete by a local aide (Weinberg, 1991).

Ministry of Natural Resources refers to this plan as "mixed management--managing buffer zones as integral to the protected area, teaching people agroforestry, and training them as tourist guides" (ibid.). And, according to Eric Ulloa, the assistant to the director of the Ministry of Natural Resources, making all national parks "self-supporting" is a long-range goal of the ministry (personal communication 1992).

Some goals of the past are still pertinent today and ought not to be ignored. Ten years ago at the First Symposium of National Parks, Carazo administration SPN director Murray Silberman advised that future successes would only be accrued by reinforcing the SPN with better and more personnel, conditioning the national parks for "decent" tourism and using them for "living classrooms", making sound scientific evaluations of areas to be protected, and seeking strong co-operation among agencies and universities (Silberman, 1982:153). Notwithstanding problems which have developed with this model (and which will be discussed in a separate section below), "Costa Rica's SPN stands out for its success and dynamism in the establishment, planning, administration, and on-the-ground implementation of management where other institutions have lagged notably behind" (McFarland et al., 1984:592). Wolfgang Hein (1989a:277) concurs: " . . . the SPN is the most respected of all MAG agencies . . . in no other area of environmental policy exists so attentive a public vigilance as that of the national parks."

Conservation Through Crisis

"No la vimos como una tragedia, la vimos como un desafío."

(We did not see it as a tragedy, we saw it as a challenge.)

- Alvaro Ugalde
(personal communication 1992)

Costa Rica sustained a severe economic crisis in 1979. Characteristic of most of the Latin American world, Costa Rica went into deep financial debt as a result of overextended loans from international banks. Unable to service the notes, Costa Rica soon became one of the seventeen most highly indebted nations of the world (Calvo, 1990:355) and had the highest per capita debt in Latin America (Barry, 1991:32). Calvo points out that much of this had to do with factors outside of Costa Rica due to the international economic recession of 1979 that was partially a result of dramatic increases in oil prices. The recession spurred high interest rates in the world capital market and a decrease in prices for traditional products that Costa Rica had to offer. Calvo (*ibid.*) refers to this as "low aggregate value of national agricultural exports in contrast to high aggregate value of imported products." He also states that the wars in Nicaragua and El Salvador during this same period weakened the Central American Common Market which hurt Costa Rican trade.

By 1985 the external debt amounted to \$3.8 billion (equal to \$1500 per person in Costa Rica) and was the largest debt in the developing world (Carriere, 1991:192). For Costa Ricans this translated into spiralling inflation--hovering around forty-eight

percent in 1980-82 (Carazo, 1989:513), a doubling of unemployment-- from 4.3 percent in 1979 to 8.7 percent in 1982 (Calvo, ibid.), austerity measures, and federal spending cuts. Especially hard hit were the budgets of environmental management agencies like the DGF and SPN (Carriere, 1991). But despite budget cutbacks, these years were also marked by a significant increase in conservation efforts and national park designations. As mentioned earlier, from 1978 to 1982 the amount of land protected by law in Costa Rica increased by 236,000 hectares, or 4.7 percent. Discovering how a nation so steeped in debt was able to accomplish this feat was part of the raison d'être of this thesis.

The debt crisis hit Costa Rica during the administration of President Rodrigo Carazo. "Keeping a clear vision . . . and a conception of priorities" was how the former president described his role in conservation through crisis (personal communication 1992). Dealing with the economy but wanting to continue the government's commitment to active conservation (by then only a ten year old movement) meant thoughtful appointments (Mario Boza was his SPN director the first half of the administration and Murray Silberman the second half), taking strong leadership in promoting new parks (i.e. La Amistad, Isla del Coco, etc.), working closely with private conservation organizations ("the environmental groups greatly aided my work") (ibid.), and recruiting financial assistance.

Finances in Costa Rica were definitely short. Carazo was the first Latin American president to suspend payments on international loans (F. Morris, personal communication 1992). The

international Monetary Fund (IMF) thereupon imposed strict austerity measures on Costa Rica and urged quick development of non-traditional crops to market abroad. Choosing "to defend the honor of Costa Rica" (A. Morris, personal communication 1992) and not wanting to impoverish the citizens of his country, Carazo kicked the IMF out of Costa Rica and promised not to devalue the colon.* In his own words, Carazo emphasized that "there is no internal problem or crisis that should serve as an excuse for a government to submit to impositions made from abroad . . . [and] for this we broke with the IMF and suspended payments on the foreign debts" (Carazo, ibid.). Fighting for the "respect of our national sovereignty" (ibid.) Carazo was the only president to boot the IMF from his or her country (F. Morris, ibid.). While personal savings, exports, and GNP were all higher during the Carazo years than during his successor's (Monge) (World Bank and Central Bank of Costa Rica data in Carazo, 1989), the country did suffer from a weak economy. Thomas Lovejoy (1982:160) compares this period to the Great Depression in the United States, not only for its financial stress, but for "recognizing the urgency of conservation projects."

The national park system had its work cut out. James Barborak (1982:117), an SPN employee at the time, posited that the country's economic crisis presented the SPN's greatest challenge

* Holding out for more than a year, he was forced to devalue in 1980.

yet: "justifying before the public and the legislative powers that more expenses were necessary for acquiring, managing and administering the areas in its care." Alvaro Ugalde mentioned that it was fortunate that many parks were already in existence before the crisis, but to manage them and create new ones during this period was to "transform crisis into opportunity" (personal communication 1992). But while the Carazo government's "enthusiastic support for financing the SPN" was immeasurably helpful (Fournier, 1991:74), inflation reduced the purchasing power of the already cut budgets. The opportunity that came, then, according to Ugalde (ibid.), was "to look for money in other places."

A fundraising campaign the likes of which the Costa Rican conservation community had never before witnessed was launched. Nationally, Costa Rican environmental groups solicited contributions, donated time, and did volunteer work in the parks. New organizations like Fundación Neotrópica (founded by Ugalde) and Fundación Parques Nacionales were established to seek grants, solicit and channel major contributions (corporate or private), advance specific environmental causes, and support ways to educate the public about tropical conservation issues (Fournier, 1991; Koepsel, personal communication 1992).

International organizations were tapped for funds and support. Bonilla (1985) lists twenty-six environmental groups from around the world (including ones from the Caribbean, the United States, Great Britain, and Austria) that assisted Costa Rican conservation during the economic crisis. The U.S. government

(through AID) and Switzerland also helped financially. And grant supporting organizations like the Tinker Foundation and the Rockefeller Brothers made generous contributions (Fournier, 1991).

A case in point is the Braulio Carrillo NP story. It was designated in the last month of the Oduber presidency (April 1978) but was shrouded in controversy soon after (Boza, 1984). The government had been planning to construct a highway from San José to Limón that would pass through pristine wilderness (montane tropical wet forest) areas in the mountains north of San José. The road was to pass on the south edge of the newly created park and environmentalists were concerned about the impact development would bring to its buffer zone. In the spirit of compromise, and with the support of a new president in office (Carazo), the government decided to continue with the road project but to more than double the size of Braulio Carrillo. The OTS was also lobbying to expand this national park to link it with a corridor to its La Selva biological station (Clark, 1990). To do this, the government would have to buy out several landholders' property. Not having the immediate funds necessary to do this but recognizing the need out of "an intimate sympathy with the cause" (A. Morris, personal communication 1992), Carazo declared the area a zona protectora--a temporary legal status protecting the area--until the OTS could start a fundraising drive for the corridor. The MacArthur Foundation came up with a \$1 million matching grant which was matched by a combination of sources that included the OTS, World Wildlife Fund, Fundación Parques Nacionales, the Nature

Conservancy, and the Costa Rican government. By the term of President Monge the challenge had been met and the expansion of Braulio Carrillo NP had been decreed. Clark (1990:16) has called this "the largest international conservation program in Costa Rica up to that date."

Costa Rica's external debt is still high—\$4.2 billion, and three fourths of its export earnings go toward paying the interest (Barry, 1991:32; Weinberg, 1991:113). The result is that the country's natural resources are being overused for short-term needs at the expense of long-term planning (Calvo, 1990). But the government has acted to stem this tide. During the Arias administration, the 1987 Costa Rica Debt Conservation Plan was formed. It "enabled the government to pay part of its debt and simultaneously invest in long-term environmental projects." (*ibid.*:357). Likewise the government has experimented with 'debt-for-nature-swaps'. Barry (1991:33) reports that over \$40 million of external debt has been erased by purchases made from international conservation organizations.* In fact, Costa Rica was the third country to participate in the swap program after its inception by Thomas Lovejoy in 1984 and the first country to receive European support when the Netherlands and Sweden forgave their loans (Redclift and

* Weinberg (1991:114) reports that The Nature Conservancy paid \$5.6 million.

Goodman, 1991).^{*} Other government programs and policies to preserve the environment will be discussed below.

Certainly the debt crisis of the early 1980's challenged Costa Rica's national environmental conscience to its very core. But as Karen Olsen de Figueres put it, "obstacles became opportunities" (personal communication 1992) and conservation not only survived but thrived. Summising that "development is an attitude" and not merely government proposals, projects, and agendas, Olsen de Figueres believes that the historical pattern of conservationist thought in Costa Rica led to its very ability to withstand the challenge of the crisis. The vision of certain individuals was instrumental in channeling this course. Among them, she related, was her late husband "Don Pepe" who by abolishing the Costa Rican armed forces in 1948 provided the means to fund other causes, and who again was president to designate the very first national parks in 1970. (She wondered if any of the environmental successes of the past two decades would have been possible if Costa Rica had been supporting a military.) She included people like Alexander Bonilla, Mario Boza, and Álvaro Ugalde ("all of whom I love dearly") who never wavered in their diligence to preserve Costa Rica's natural heritage, especially during the crisis. Julio Calvo (1990) suggests that instead of always more and more money,

* The Redclift and Goodman study supports debt-for-nature swaps for Costa Rica but warns of serious disadvantages (not the least of which are questions of national sovereignty and solving for ecosystem protection with improper management techniques) which could be accrued from their abuse.

many conservation efforts require only shifts in policy and can be accomplished in the midst of economic hard times. In conclusion, he states that " . . . Costa Rica has the productive capacity, and the socio-political and administrative abilities to implement [a] strategy of sustained development" (Calvo, 1991:357).

V. Framework for the Future

"El futuro ambiental de Costa Rica es muy positivo."

(The environmental future of Costa Rica looks very positive.)

- Rodrigo Carazo (personal communication 1992)

The government of Costa Rica has responded to environmental problems in other ways besides the development of national parks and protected areas. Obviously some situations (e.g. pollution, pesticide abuse, etc.) require different approaches than conservation commitments. Likewise, designating parks and preserves is not the only method available to protect the environment. This chapter will visit four different approaches being applied in Costa Rica.

First, it will be necessary to examine the structural (governmental) framework and policy decisions which were established to protect and monitor the environment. In turn, monitoring the government is an important tenet of a democratic society which will need to be analyzed next. In Costa Rica, a strong network of non-governmental organizations exists as a 'watchdog' for policy-making and enforcement. Because agriculture has been a cause of much environmental degradation, recent advances in sustainable development also will be included here. And finally, this chapter will look at the role environmental education plays as one of the unique ways in which Costa Rica remains on the cutting edge of ecological thought and planning for the future. Each approach can be traced to a nation's emerging environmental conscience.

Policy Responses for Environmental Management

. . . the era of ecological illiteracy . . . is disappearing in Costa Rica and in its place an authentic environmental revolution is being born. The public opinion in general is demanding more and more energetically that the government adopt the necessary means to solve serious environmental problems, such as deforestation, erosion, and pollution.

- Alexander Bonilla (1985:64)

"Solving" is perhaps a bit too idealistic of a term to describe the Costa Rican government's approaches to confront the nation's serious environmental problems. 'Mitigating' the harms might define the policy responses better, but whatever the semantics, what is important is that the people are conscious of the problems and the government is confronting the issues.

The structure through which much of this activity occurs is the framework of government agencies that deals with environmental policy. The Ministry of Agriculture and Livestock (MAG) became more intensely involved with federal land issues in 1949 when a forestry section was established under its auspices. Conservation, however, was hardly its province at this time when development was the engine behind land use policy. It would be another twenty years before MAG's duties were amended to include conservation management of public lands and wildlife (including fisheries) with the passage of the Ley Forestal in 1969.

Much of the story of the creation of the General Forestry Directorate and National Park Service within MAG as agents of conservation (and problems inherent in such a relationship) already have been discussed. To create a more unified effort to manage

public lands more effectively and to deal with other environmental issues, the Ministry of Natural Resources, Energy, and Mines (RENEM) was established by President Óscar Arias in 1986. One of RENEM's purposes was to serve as an administrative and supportive umbrella agency for various departments dealing with natural resources. DGF and SPN fell under this category as did the Department of Wildlife, Department of Geology and Mines, the administration of the National Zoo and other agencies (Ulloa, personal communication 1992). Hein (1989a:278) adds that RENEM's establishment brought with it "the hope of developing a strong institution that would give the necessary support for the realization of a more ecological perspective" to the management of the nation's natural resources.

More than just a lofty ideal, RENEM sought to accomplish this goal by creating and implementing the National Conservation Strategy for Sustained Development. The Strategy was the offshoot of Costa Rica's participation at the 1980 World Strategy for Conservation (jointly sponsored by the United Nations Programme for the Environment, IUCN, and the World Wildlife Fund) (Fournier, 1991:89). The Strategy's objective is to "change the thrust of development toward a more sustainable form" (Calvo, 1990:356) and inheres an evolving effort that is updated periodically in response to new technology and discoveries. The project was also an attempt by the Arias administration to respond to "present policies which fail to integrate conservation and development--resulting in inadequate and unenforceable legislation,

poor organization, inadequate environmental planning, and lack of conservation-based rural development" (*ibid.*). The comprehensive plan was funded in great part by international conservation organizations.

Nine principal objectives and fourteen sectors of focus are identified in the Strategy (see Appendix 1.). The objectives are national environmental goals that would ensure balance between development and conservation. The sectors are specific areas of focus (i.e. watersheds, mining, etc.) that have been earmarked for professional attention and research. Each sector is assigned a co-ordinator (a specialist in the field) and five professional research assistants. Over time these teams are to prepare comprehensive, interdisciplinary reports on how the identified objectives can be applied to the individual sectors. Fournier (1991: 89) suggests that these areas of study "cover practically all activities of Costa Rica . . . and it is hoped that this so carefully elaborated theoretic scheme will work for the benefit of the country." It is thus far too early to judge the Strategy's progress, but it is important to view it as a tangible vehicle to help guide the government's role in protecting Costa Rica's natural resources for long-term, sustainable use. Implementation and enforcement of its suggestions will be the litmus test of its success.

An earlier attempt for a similar proposal was the creation of two distinct departments within the National Planning Office (OFIPLAN). In 1981, President Rodrigo Carazo inaugurated the

Sectorial Agropecuario (agricultural sector), which was in charge of producing large-scale land use capability studies, and the Política Económica (economic policy), which published the comprehensive "First National Plan for Forestry Development" (Fournier, 1981:17). OFIPLAN originally was commissioned as a "body of control" between economic and ecological issues (Dengo, 1977:519) and, according to Carazo (1989:480), the two new sectors

were born out of caution for the environmental problems that have become so complex that only multidisciplinary teams have the capability to analyze them and propose viable solutions . . . reason enough that solutions should be raised to high level political decisions. . . . [Their] fundamental work is to co-ordinate and harmonize the national effort of environmental protection with the goal of being able to globally define the philosophical and political line between such conflicting areas as this and in a country so eminently agricultural as ours.

The OFIPLAN land use studies became useful geographical data in determining areas that needed protection and in evaluating agricultural techniques.

Other government agencies are involved directly or indirectly with environmental management. Costa Rica's electricity commission (ICE) is one of the country's most outspoken proponents for, and active monitors of, watershed protection. Erosion disasters of the 1960's and 70's seriously diminished water supplies on which hydropower generating stations were highly dependent. Thomas Lovejoy (1982:157) maintains that the monetary value from generated electricity is one of the most visible advantages of watershed protection and therefore one of the most convincing

arguments the government can use to garner support from otherwise non-environmentally minded citizens. Costa Rica, he claims, has understood this better than most other countries.*

The Costa Rican Tourism Council (ICT) likewise has a vested interest in environmental protection. It is active in promoting conservation causes and in educating the public about tropical ecology. ICT commissioners are often included in advisory councils and are active proponents of preservationist policies. (A more thorough discussion of the relation of ecotourism and economic growth is discussed separately in Part VI.)

CONAI, the government's Indian affairs agency, manages Costa Rica's indigenous reserves which are considered protected areas. These reserves are not open to development and are thus intended to remain for the exclusive use of native tribes, including sustainable harvests of local plant and animal resources.

The Office of the President also enjoys considerable influence in advocating environmental policy. The power to decree national parks and protected areas is given to the president of Costa Rica via the Ley Forestal. Likewise, the president may exert his power to influence a specific environmental issue. Rodrigo Carazo, for example, urged the Standard Fruit Company to limit

* The McDonald's hamburger chain in Costa Rica (perhaps in cathartic response to past policies of encouraging increased beef production in Costa Rica's forests) is helping in this effort and has launched a public relations campaign. Its motto, "Cuidar el arbol es cuidar el agua" (Caring for trees means caring for water) is seen throughout San José and seed give-aways for reforestation are available with some purchases.

pesticide use on its banana plantations near Cahuita NP when it was discovered that residual run-off was flowing into the Caribbean and threatening Cahuita's extremely fragile coral reef ecosystem (Weinberg, 1991:165). Carazo also inaugurated the Center for Environmental Information as a joint project of the State Extension University and the National Park Service (Boza and Mendoza, 1981). The election of Óscar Arias in 1986 "brought the dawn of a new environmental awareness" with his commitment to create RENEM and his attention to national park protection (Calvo, 1990:356). In his own words, Arias (1988:302) appreciates the role Costa Rica can play in protecting the environment:

Our small country can feel satisfied and proud to bring its grain of sand to the future of life on this planet. With humility it aspires to convert itself as a prototype of the new societies necessary to live together peacefully on earth.

The current president, Rafael Calderón, announced he will form a plan to create a "New Ecological Order of International Co-operation" (Sheaff, 1992:1).^{*} Part of this goal was accomplished in June 1992 when RENEM director Hernán Bravo and the Costa Rican delegation to the Earth Summit (the UN Conference on the Environment and Development in Rio de Janeiro) introduced a resolution supported by Central American nations to station the Earth Council in Costa Rica. This body will be the administrative seat

^{*} Not having seen much attention given to the environment by the conservative Calderon administration since its inauguration in May 1990, representatives from various Costa Rican conservation organizations have called this a "rhetorical plan" and a "campaign trick" that was at best "demagogic and opportunistic" (as reported in Sheaff, ibid.).

of the Earth Summit and will serve as the official headquarters to follow up on agreements reached in Rio de Janeiro. It will be located at the University for Peace outside of San José. In addition to the honor this bestows on Costa Rica in recognition of its active commitment to environmental conservation, many believe the Earth Council will generate important economic and educational resources for the benefit of the country. Full page ads in Costa Rican newspapers congratulated Calderón and Bravo for their efforts and success on this proposal that was two years in the making. An editorial that appeared in La Nación (one of San José's principal daily newspapers) soon after the Rio conference proclaimed that

Calderon has obtained his greatest foreign policy victory with the Rio Summit's designation of Costa Rica as the permanent seat of the Earth Council. We are converting ourselves as a nation into one of the principal centers of world ecology (Álvarez, 1992:15a).

Not everyone agrees with this assessment. Leaders of Costa Rican environmental groups, like César Castro of ASCONA, maintain that "the government is scrambling for eleventh hour strategies" (as quoted in Sheaff, 1992:5). The director of the Costa Rican Ecological Association, Orlando Ávila, was more succinct in his criticism: "While the government is promoting Costa Rica abroad as a model of environmentalism, the rape of natural resources continues at home without the political will to stop it" (ibid.). And Guillermo Barquero of the National Organization of Wildlife and Conservation reacted by saying that "Costa Rica is creating

a myth, without meaning or content in practice, in legislative and environmental policy" (*ibid.*). Likewise the conservationists complained that the environmental organizations were not consulted in the planning process for the proposal to establish the seat of the Earth Council in Costa Rica.

Another oft-cited criticism of the government's approach to environmental management is in this multiplicity of bureaucratic agencies. Between the Office of the President, the Legislative Assembly, and the "megastructure" of agencies involved, there is, according to University of Costa Rica professor Sergio Salas (1982:28), "too much diffusion of responsibility" and because of

institutional jealousies, the practical absence of interinstitutional co-ordination, and the difficulty of having interdisciplinary teams within the planning agencies . . . there exists competition between the institutions that diminishes their overall efficacy. As a final result, we see a growing ineptitude between the government, its employees, and the environment.

As proof, Luis Fournier (1981, 1983) lists twenty-four government agencies that either directly or indirectly deal with environmental issues, often with overlapping or conflicting results. Carriere (1991:193) offers three reasons for this phenomenon: different agencies were created during different presidential administrations (each with various political pressures and lobbies), the fact that it proved easier to launch new agencies than to regroup existing ones, and that many ministries of the government developed their own environmental section as a response to the activities the State was required to perform for environmental assessment and control.

The creation of RENEM as an umbrella organization did not seem to correct this problem. Luko Quirós (1989:311), an environmental scientist at the National University, stated that "we are swimming in information [and] overspecialization" and suggested that economic and political considerations are preventing the government from co-ordinating and enforcing environmental policy. Another study concludes that this "multitude of policies" and the "numberless agencies" has resulted from "the considerable expansion of environmental activities, but it was an expansion without concept" (Hein, 1989:276). And Carriere (1991:194) reports "twenty-seven sections, divisions, juntas, institutes, councils, and oficinas often working at cross purposes and almost never acting in co-operation with each other. . . ." Even the assistant to the director of RENEM, Eric Ulloa, agrees. In a 1992 interview, he admitted that there is just

too much duplication of efforts, especially between RENEM and MAG. Likewise, we have a commission on Women in the Environment and recently the Office of the First Lady [Señora Calderón] has created a similar council. We want co-ordination, but it has not happened yet.

Within departments or agencies there is also duplication of efforts. In his paper "Bureaucracy and the Unmanaged Forest Commons in Costa Rica", George Guess (1979a:32) reveals that the DGF alone has a plethora of "planning commissions, committees, councils, etc." none of which has authority to change policy or enforce new measures. Guess argues that this "serves to transmit contradictory priorities to operating agencies" (ibid.:37).

Solutions exist. Guillermo Porras (1982:145) of the DGF believes that the Legislative Assembly should recognize that if it does not act to reform the system the "atomized actions of the State . . . [will continue] to increase the costs and diminish the efficiency" of the agencies. Fournier (1981:20) agrees when he writes that the laws regarding natural resource administration "should be revised in detail to produce legislation that . . . eliminates the overlapping, duplication, anachronisms, and counterpositions that now exist." Quirós (1989:311) adds that

. . . instead of creating [more] structure, large entities, and bureaucracies concerning the environment, the government should support community initiatives and organized groups with local, specific agendas.

He lists several such local groups that are in need of State aid.

For its part, the Legislative Assembly has played a role in environmental policy-making. Enacting laws has been essential to conservation and environmental reforms. In addition to the 1969 Ley Forestal, the legislature has passed (among other things):

- the 1970 Wildlife Conservation Law (which recognizes that wildlife preservation is in the public interest)
- the 1973 bill which established CONICET (to fund scientific research, especially for tropical ecology)
- the 1977 Air Pollution Law (dealing specifically with particulates and cement dust hazards)
- the 1977 Indian Law (providing that Indian reserves are for the exclusive domain and control of Indians)
- the 1981 National Act for the Protection and Improvement of the Environment (SINAPROMA)*

* SINAPROMA was conceived as a way to plan, co-ordinate, and organize policies for environmental protection and management. However, the economic crisis and changes in government basically shelved the idea at this point in time (Fournier, 1991:78).

- the 1982 establishment of the Department of Environmental Sanitation (within the Ministry of Health)
- the 1989 Law for an Environmental Code (to up-date and co-ordinate disperse environmental laws and decrees)
- the 1989 proclamation against constructing an interoceanic canal using the San Juan River on the Nicaraguan border (based on potential ecological effects)

Currently being debated within the Legislative Assembly is Costa Rica's involvement in the Central American Commission on the Environment and Development (CCAD). This commission's primary task will be to respond to international pressures that seek to allow toxic wastes to be dumped in Central America, not excluding Costa Rica. The United States in particular has been bombarding Central America with attempts to dispose of hazardous materials on the isthmus (Tico Times, 5 June 1992:5; Olsen de Figueres, personal communication 1992).

Finally, as a statement of its commitment to environmental improvement, the government of Costa Rica has sponsored and participated in a host of conferences, symposia, and conventions concerning the ecological well-being of the country. Soon after the political revolution of 1948, the Figueres government sent two delegates to the InterAmerican Conference on the Conservation of Renewable Natural Resources in Denver, Colorado. The Costa Rican representatives presented a paper on rational forest management. In 1949, the Forest Council was established to maintain an active inventory and discussion of forest resources. (It lay dormant for many years, however, before it became the working entity it is today with the new name 'National Forest Congress'.)

There exists little information on conferences sponsored or attended by Costa Rica in the 1950's and 60's, but in the next three decades "there was an important increase in the ecological conscience in the country, expressed in the organization of symposia and congresses. . . ." (Hein, 1989a:274). There was Costa Rican participation at the IUCN's 1972 Second World Conference on National Parks in Jackson, Wyoming. In 1974, San José hosted the First Central American Regional Meeting on the Conservation and Management of Natural and Cultural Resources. Topics there ranged from international border parks to preserving cultural and historic sites. In 1975 (also in San José) Costa Rica had the International Symposium on Forestry Science and Its Contributions to Development in Central America. The same year, it hosted the Symposium on Central American Ecology and Conservation.

As a sincere attempt to plan for the future of the country, in 1977 the government organized the Symposium for Costa Rica in the Year 2000. Economic development tended to be the conference's general focus which included an important "round table" to discuss "Natural Resources". Jorge Dengo (1977:519), editor of the conference's proceedings, set the tone for this discussion when he posited that "we live day-to-day without much worry for the future . . . and we show very little sense for the future consequences of our present actions." Other participants included President Daniel Oduber (who stressed the importance of protecting natural resources), noted Costa Rican parasitologist and conservationist Rodrigo Zeledón (who pleaded for better governmental

investment in scientific research), anthropologist María Bozzoli de Wille (who discussed the disadvantages of the cattle industry that were surpassing all the advantages), national parks director Mario Boza (who argued that more environmental education is needed before national parks became the last remaining forests in Costa Rica), and tropical botanist and pioneer advocate for rational use of the environment Luis Fournier (who reiterated the need for more research and the need to direct the nation's development to be balanced with protecting natural resources). Dengo's hope for this symposium was to help direct the government to control

the exploitation of these natural resources towards the processes of economic development for the hopeful social benefits of placing value on the potential wealth of the country. . . . The impacts caused to the biosphere and to human societies from the poorly understood use and abuse of natural resources, have created a conscience to develop well directed policy that should balance economic exploitation with the rational management of those resources to have one ecologic-environmental-social system (ibid.:519. 537).

It is difficult to gauge the overall efficacy of this symposium in terms of the present condition of the Costa Rican environment. George Guess (1979a:32) has called the conference "a huge planning catharsis." He recalls that the Caribbean port of Limón was closed down for almost a year during this time due to sediment build-up from topsoil erosion--a direct result of poor planning that allowed deforestation and overdevelopment with significantly negative national and local economic consequences--the very type of conditions the conference was trying to address. But it did display an awareness of, and a willingness to deal with, the vast

dilemma of development versus protection. Environmental education, national park development, research opportunities, and the government's emphasis on inventorying biodiversity have all increased markedly in the years since the symposium, even if those activities were not direct results of it.

Since then there has been an even more bewildering expansion of conferences and symposia, of which a list as near as complete as possible follows:

- 1979, Second International Forestry Sciences Conference
- 1980, First National Symposium on Environmental Pollution
- 1981, First (national) Symposium on National Parks and Biological Reserves
- 1982, The IUCN's Third World Congress on National Parks (held in Bali, Indonesia)
- 1985, The Symposium on Natural Resources and Development in Costa Rica
- 1985, First National Environmental Congress
- 1986, First National Forestry Congress
- 1988, Second National Symposium on Environmental Pollution

This trend seemingly is being continued into the 1990's.

Shirley Christian (1992:A6) comments that "here in Costa Rica, some kind of conference on the environment takes place almost every week." A stroll through environmental agencies reveals posters and announcements of various working committees and conferences. Several observed in summer 1992 include: The Round Table on the Protection of the Environment as a Fundamental Human Right (jointly sponsored by the Costa Rican Supreme Court and the

Regional Meeting of Human Rights in Latin America and the Caribbean), The Round Table on Guanacaste: Crisis and Perspectives of Development (sponsored by the University of Costa Rica), and COSEFORMA, a working conference on the co-operation of the forestry and timber industry sectors (sponsored by DGF).

The obvious question to be asked is whether this number and diversity of conferences on the environment is doing anything about the environment. Hein (1989a) links the origins of the symposia with a nation's developing environmental conscience--as an indication of its commitment to deal with the problem. Certainly conferences draw from a wide spectrum of different professionals all adding expertise or advice to the topic area. And certainly the education gained, and the publicity stemming from, such fora can be viewed as a valuable vehicle for change.

The criticism of this system, however, is in its inherent bureaucratic inability to translate ideas and decisions into workable, enforceable strategies for conservation and environmental protection. Costa Rica has suffered from a "technocracy that tend[s] to neutralize a potent electorate with bureaucracy" (Gómez and Savage, 1983:6). Hein (1989a:273) refers to this as Costa Rica's "long legislative history of environmental law with no execution." He cites, for example, legislative and political barriers which effectively blocked implementation of the principles outlined in the Law for the Protection of the Environment. Inadequate funding for agencies to implement the suggested proposals also impedes their success (Ulloa, personal communication 1992).

But the alternative seems worse: the absence of continuing dialogue could potentially stifle creative thought and could lead to even greater governmental inaction. It could also decrease the opportunity for professional, interdisciplinary participation in the decision making arena. According to economist Jaime Hurtubia (1980:195), environmental problems are hardly solved by biologists alone. He cites the necessity of a "transdisciplinary science" to include historians, sociologists, and other social scientists (as well as biologists) to join together to seek solutions to problems of the environment. Wolfgang Hein (1989b:283) agrees and adds that because most of the literature that deals with ecological dilemmas was written by biologists, agronomists, and foresters, "a systematic and extended analysis of the socio-economic origins of the ecological crisis has not been included" in their suggestions for improvement. Estrella Guier (1982:61) labels this an "anthropocentric" approach that "would take into account the . . . social, economic, and cultural context" of the problem being addressed. Conferences, symposia, and workshops offer a viable means to include "total participation of all sectors of society" (Brenes, 1984:63) in an open, professional forum that is essential to a democratic society.

Government agencies, legislative laws, and national (and international) conferences that deal with the ecological well-being of the nation are all an integral (albeit redundant and often ineffectively implemented) part of the Costa Rican framework to address the environment. The structure is set to seek solutions.

The Non-Governmental Approach

The expansion of the Costa Rican environmental movement and conservation organizations is a natural growth. [Like] a tree given roots, sunshine, fertilizer, water, and allowed to grow, the movement has become what it is today.

- Karen Olsen de Figueres (personal communication, 1992)

Non-governmental organizations (NGO's) abound in Costa Rica. Local groups, national associations, and international environmental organizations play an active role in monitoring the government and working to lobby for (and fund) conservation efforts in Costa Rica. The proliferation of NGO's in the last fifteen years stems directly from the people's perception that the government has been unable to address adequately the country's deteriorating environmental conditions (Barry, 1991). They also gauge public opinion, endorse or reject governmental policies, and encourage (sometimes pressure) the public to become involved (Fournier, 1991).

Founded in 1968, the Colegio de Biólogos (College of Biologists) is considered to be Costa Rica's first environmental organization. It was organized by UCR biology professor José Alberto Saenz as a professional association of biological scientists. It soon became involved, however, in lending technical advice, scientific experience, and professional assistance to conservation causes (Boza, 1974; Gómez and Savage, 1983). It became an especially important entity in the 1970's for championing the defense of the Costa Rican environment (Fournier, 1991).

The Costa Rican Association for the Conservation of Nature (ASCONA) is the country's oldest grass-roots environmental organization. It was established in response to the United Nations' Stockholm Conference on the Human Environment by a "group of university youth whose goal was to foment a new attitude about man's relation with nature" (Bonilla, 1985:83). Since its inception in 1972 it has been a voluntary organization made up of "all levels of the population" (ibid.). Its primary focus has been to serve as a "watchdog" for environmental policy and to offer assistance "to the public and private sectors in the conservation of natural resources" (McFarland et. al., 1984:594). According to a brochure from ASCONA headquarters in San José, the group's five principal goals are: to promote the rational use of natural resources--insisting on "development without destruction"; to help educate Costa Ricans about the importance of conserving the environment and its unique biodiversity; to promote the creation and enforcement of environmental protection laws; to collaborate with state and private institutions for the conservation of nature; and to monitor the restoration and protection of the "physical, biotic, and cultural environment for the benefit of present and future generations."

Alexander Bonilla was one of the leading founders of ASCONA and served as its first president throughout the 1970's and its conservation director in the 1980's. During these years, the group was involved in a wide range of issues including national park promotion and protection, urban planning, reforestation,

soil conservation, watershed protection, legislative lobbying for environmental laws, pesticide reduction, industrial pollution regulations, mining policy, public health standards, and mangrove habitat protection. It also was involved in performing environmental impact assessments and in providing sustainable forest management education to local campesinos. It has enjoyed a good working relationship with ICE (the electricity commission) on watershed issues and reforestation. Carolyn Hall (1985:89) perhaps sums it up best in saying that ASCONA was an "ecological pressure group" for environmental reform in the 1970's and 80's. And Bill Weinberg (1991:114) suggests that ASCONA "grew to be one of the most respected and powerful environmental groups in Latin America."

Certain preserved areas are directly attributable to ASCONA efforts. Bonilla (1985) lists the Puriscal, Quepos, and San Carlos reforestation projects and the salvaging of Palo Verde NP as an intact entity as major ASCONA successes. Likewise, vulnerable coastal mangrove swamps were protected through the work of ASCONA in helping to pass through the Legislative Assembly a bill to create the Zona Marítima-Terrestre which also provides for oil spill clean-up (and prevention) and coastal pollution controls.

ASCONA is best known, however, for its 1983 campaign against a proposed oil pipeline ("el oleoducto") that would have connected Limón on the Caribbean side with Costa Rica's Pacific coast. The idea for such a "dry canal" stemmed from the 1970's when it was believed that Costa Rica would stand to profit greatly from

its geopolitical position as an alternative to the Panama Canal. Shipping companies were seeking ways around the expense and tankard size constraints of canal transportation. The oleoducto seemed like a viable alternative and was supported by the Costa Rican government. Environmentalists, however, warned of ecological disasters that would occur from the pipeline's construction through pristine Costa Rican forests and of the dangerous threat it would pose (in the event of oil spills) to Costa Rican shores. Thus, ASCONA was instrumental in helping form the National Committee Against the Pipeline and mounted a nationwide publicity campaign to educate Costa Ricans about the possible environmental consequences. Much publicity centered around the 1978 oil spills in Alaska and Chile to demonstrate the reality of the environmentalist community's concern (Bonilla, 1985). The oleoducto was never built.

Despite this victory, ASCONA faced some serious challenges in the 1980's. It became the recipient of financial support from the U.S. Agency for International Development (AID) which required that salaried staff be a precondition of aid (Weinberg, 1991:114). While this proved successful for some of its projects (most notably the effort to develop local support for national parks using Peace Corps assistance [Koepsel, personal communication 1992]) it also led to the decline of its volunteer-rooted organization and membership dropped (Weinberg, ibid.). AID funds to ASCONA were cut off during the oleoducto controversy because the United States supported the pipeline's

construction. This caused a split within ASCONA ranks with some taking sides in support of the project. Professor Quirós (1989: 312) writes that this "signalled the climax of the national conservation movement's crisis." A volunteer with ASCONA at the time agrees, saying that "the pipeline got it [ASCONA] in trouble, from which it never completely recovered " (Koepsel, ibid.).

Today ASCONA is still an active force within the Costa Rican environmentalist community but at a reduced scale from its former status. Its headquarters are located in a small facility that is part of a house in a relatively out-of-the-way San José neighborhood (compared with its large office it occupied in the early 1980's). Wolfgang Hein (1989:275) laments that

ASCONA's successes were not transmitted to the development of a strong ecological movement, but on the contrary, conflicts basically of a partisan character within ASCONA, took the association to the brink of collapse.

SPN director Álvaro Ugalde suggests that compared with other Costa Rican NGO's, ASCONA today offers "a more critical" approach towards government programs and conservation efforts, but added that this certainly is a "help to the cause in a different way" (personal communication 1992). Research and legal action are still two of its primary foci, however, and recent projects include environmental assessments of coal mining in Talamanca and road construction through La Amistad NP as well as studying pollution sources in the Tarcoles River (Blake and Beecher, 1991).

Other environmental groups emerged to support conservation. The Fundación de Parques Nacionales (National Parks Foundation)

was formed in 1982. Its mission has been to seek and distribute national and international funds (grants and donations) for national park projects. Much of the fundraising is for purchasing private inholdings within national parks to ensure the ecological integrity of the area itself. It also helps fund the development, management, and protection of national parks and equivalent reserves (McFarland et al., 1984; Blake and Beecher, 1991).

Founded in 1986 by Álvaro Ugalde, Fundación Neotrópica promotes "activities that are directly related to the conservation of Costa Rica's natural heritage" (Fournier, 1991:80). Among its goals are the acquisition of private lands for nature reserves, protecting endangered species of flora and fauna, promoting ecological education through its publications branch--Heliconia Press (which publishes many of the guides to Costa Rican national parks), and promoting resources for scientific tourism. It has become known for its promotion of sustainable development in communities near the national parks by providing a market ("Nature Stores") for local artisanry and products made from forest resources (Blake and Beecher, 1991). In 1988, Fundación Neotrópica, with the assistance of Conservation International, completed a very comprehensive study entitled Costa Rica: Evaluation of the Conservation of Biological Resources which specifically prioritizes areas, resources, and wildlife to be protected.

Other national environmental NGO's include:

- VERDES (Volunteers for Ecological Defense and Recuperation)
- The Costa Rican Ecological Association

- The National Organization of Wildlife
- Amigos de la Naturaleza (Friends of Nature)
- Amigos de Lomas Barbudal (a research and training center)
- Amigos de las Aves (Friends of Birds)
- ARBOFILIA (an organization founded in 1987 specifically to "share talent, time, and knowledge of agronomy and ecological biology . . . in exchange for the people's promise not to cut down the trees or burn the land" near Carerra Biological Reserve [Knight, 1992:11])
- APREFLOFLAS (the Preservationist Association for Flora and Fauna, whose volunteers patrol protected areas for poaching and illegal logging)
- VIDA (Volunteers for the Research and Defense of the Environment)
- CEDARENA (the Center for Environmental and Natural Resource Law, which researches legal issues for conservation concerns and maintains an information data bank; utilized by the World Bank)
- CIDESA (the Research Corporation for Socio-Environmental Development)
- CORENA (the Committee on Natural Resources)
- The Association for the Defense of the Escazú Hills
- The Audubon Society of Costa Rica

Another entity which deserves mention here is the growing environmental political party PEC (Partido Ecologista Costarricense). After years of studies and committees, the PEC was formed in 1984 with Alexander Bonilla as its first president. Calling it the "new hope" for Costa Rica, Bonilla (1985:266) writes that

the PEC was born as a new alternative among the traditional political parties whose lack of environmental knowledge and lack of recognition of the ecological interrelationships of a society have been maintaining an ancestral economic hegemony.

The party's focus centers on national environmental concerns, agrarian reform, and non-violence (Weinberg, 1991). While it has not yet "brought with it the fortification of the ecological movement" in Costa Rica (Hein, 1989a:275), it does make a presence in many local and national elections. It is one of the few active 'Green Parties' in Central America.

International NGO's also have had an historical and on-going role in Costa Rican conservation. Since its charter membership in the International Union for the Conservation of Nature (IUCN) in 1948 (Fournier, 1991), Costa Rica has welcomed advice, finances, and attention from the international environmental community. As previously mentioned, these NGO's were of tremendous assistance to Costa Rica in the early years of national park development and especially during the years of economic crisis. Today, many international NGO's have tropical conservation priorities and often have research programs in or about Costa Rica. Some of these include the Nature Conservancy, Conservation International, IUCN, Audubon Society, Rainforest Alliance, Rainforest Action Network, Sierra Club, and the World Wildlife Fund which even maintains an office in San José. Bill Weinberg (1991: 124) reasons that

the world environmental movement sees Costa Rica as something akin to a living laboratory [with] cutting edge concepts for saving tropical forests. . . . [It] injects an unusually large amount of money into Costa Rica proportional to its size. This is because the Costa Rican government has demonstrated its concern to save the nation's wild areas and remarkable diversity of species, and the tradition of stable democracy provides a political climate conducive to experimental strategies.

Some studies, however, point out that social disadvantages can result from what might be called an overly North American or European attitude towards environmental conservation in Costa Rica. Jean Carriere (1990:198), for example, submits that

on the other hand, the U.S.-influenced environmental institutions . . . tend to see environmental protection in isolation from the social context, and would soon convert Costa Rica's forests into fenced-off green museums surrounded by starving peasant families.

Carriere offers no precise examples of where this attitude has prevailed and seems to avoid mentioning all current NGO analysis of rural sustainable development that dominates the conservation literature and that is certainly becoming the trend in Costa Rica today. Nonetheless, if it harkens back to the days of 'scientific imperialism' from the 1950's and 60's, it could be a sound caution to heed.

Regional NGO's are a more recent addition to the Costa Rican conservation scene. In 1978, the Mesoamerican Federation of Conservationist Associations was formed at a regional gathering of environmentalists in Guatemala City. In 1987, the Regional Network of Non-Governmental Conservationist Organizations was created at the First Central American Conference for Environmental Action in Managua, Nicaragua. Costa Rica participated in both. With assuredly good theoretical intentions and filling a need for all countries and NGO's involved, the redundancy of these associations, however, is obvious and it is difficult to find evidence of their successes. Outside of Central America exist two other NGO's which specifically address

environmental issues of the region. The San Francisco based EPOCA (Environmental Project on Central America) investigates a wide range of conservation issues, including ones pertinent to tropical conservation in Costa Rica. (EPOCA has been specifically involved with the environmental consequences of civil wars in Nicaragua and El Salvador.) The other is PACCA (Policy Alternatives for Central America) which is based in Washington, and deals with many political, social, and environmental issues.

Looking at this twenty year history of NGO involvement in Costa Rica provides an opportunity to comment on the nature of its strengths and weaknesses. "Twenty years ago", Álvaro Ugalde remembers, "there were not any NGO's here, and now there is a pile!" (personal communication 1992). Their success is visible in the record of conservation accomplishments realized with the active grass-roots support of their members and volunteers. A criticism is that most of these members are highly intellectual and perhaps do not represent a broad cross-section of Costa Rican society (A. Morris, personal communication 1992). Luko Quiro's (1989) offers that this cultural gap can be bridged by giving more attention to local groups and projects (e.g. ARBOFILIA, Los Amigos de Barbudal, and a local branch of VIDA which monitors buffer zone ecology of Braulio Carrillo NP) instead of concentrating on larger scale national agendas. Weinberg (1991) faults Costa Rican NGO's for overattention to publicity generating rain-forest issues and insufficient attention to "ecocide" occurring on the country's agricultural landscape. He also believes that

the NGO's tend to be selective in their causes. He cites for evidence the mid-1980's orero controversy when an estimated 1,500 gold-panners (with 3,500 legal mining permits) invaded areas in and around Corcovado NP (Weinberg, 1991:109). "The environmental movement", he states, "supported their ouster, but did nothing about the large mining companies nearby" (ibid.). The NGO's, according to IUCN consultant Felipe Matos (1982) are growing in importance every day, but should begin to join their diffuse efforts together to gain more public support for a united conservation approach.

Changes in Agriculture towards Sustainable Development

For Costa Ricans it is absolutely necessary to look back to those work systems that have been permeated only very slightly by mercantile agriculture and the massive use of imported technology and to observe the way in which they have unfolded, to see the relation between man and the natural environment that surrounds him.

- William Reubén Soto (in the prologue to Bozzoli de Wille, 1986:6)

Because agriculture is the number one industry in Costa Rica and because it accounts for over one half of the country's land usage and two thirds of the national economy (Leonard, 1987:197; Carvajal, 1992:24), it is important to understand the framework being built for the future well-being of this realm of society. Research, education, and training of sustainable agricultural development are under way in Costa Rica. María Bozzoli de Wille (1986:8) explains that this is part of "a world movement that is questioning the modern systems of treating the environment . . ."

and that is studying very closely past and present "societies which are able to maintain themselves without destroying the resources of their land."

Driving around Costa Rica, one is struck with the largesse of the agricultural scene. The thousands of acres of coffee bean plants, cattle pasture, African palm and banana plantations, and ornamental plant fields cause one to wonder if all of this could/should be abandoned for what Wolfgang Hein (1989b:283) argues should be "a return to small-scale agriculture of a variety of different products." Environmentally, the "should" is a moot point, as has been learned so poignantly through the history of Costa Rican agricultural disasters (environmental and economic) since the 1950's. Socially, such an abrupt change could spell increased unemployment and lower standards of living, thus intensifying the debate on the future of agriculture. Enter the push for sustainable development: the agricultural search for balance and harmony in a given environmental setting with long-term renewability of natural resources.

The key to understanding their approach to sustainable agriculture is how Costa Ricans are learning to perceive of "a given environmental setting". Can some areas sustain monocultural crops? Are some areas more readily useful for pasture or plantations? Can other areas adapt to agriculture without surrendering their overall ecological integrity (i.e. through organic farming or integrated pest management)? These are the questions that were tested in a 1987 study entitled "Natural Resource Management

in Costa Rica" that was partially funded by U.S. AID. The result was a geographical delineation of land use capability (LUC).

The LUC study identified five land types "where the most intensive use that a piece of land is able to sustain on a continuous basis without suffering from degradation" occurs (Carriere, 1991:186). The five categories are: land for clean-tilled crops, pastureland, permanent crop cover, forest, and protected areas. That the study recognizes the importance of agricultural land (three of the five LUC's) should put to rest the accusations of those who claim environmentalists want nothing more than national parks. The point is to bring balance into development.

Without going into agronomical detail, suffice it to say here that the LUC study enumerates how many hectares should be in each category and defines their locations in Costa Rica based on soil studies, drainage, topography, and climate (Hall, 1985). This information has been used repeatedly, for example, in showing the magnitude of degradation caused by the cattle industry (as was discussed in an earlier chapter) with its current 19,000 square kilometers of pasture cf. the 4,656 square kilometers identified for pastures by LUC.

The problem, therefore, is not in acquiring the information for sustainable agriculture, but rather in disseminating it and encouraging (enforcing?) its implementation. Professor Carlos Brenes Castillo (1989:169), a sociologist at the Technological Institute of Costa Rica, lists four principal barriers to sustained agricultural development: an absence of capital which prevents

initial investment, problems in dispersing available technology, "lucrocentric" legislation that favors big corporations and monocultural production, and dealing with some Costa Rican cultures that are based on subsistence farming only and seem unwilling to diversify.

The good news is that different sectors of Costa Rican society are grappling with these barriers. First, to deal with the issue of capital investment, the government has provided tax incentives and banks are making loan credits more easily available to farmers practicing soil conservation and other sustainable methods (Hall, 1985). Likewise, the forestry industries are being urged to diversify their capital investments to include locally produced smaller wood products (Lemus, 1985). The argument exists, however, that the government has not yet made sufficient strides in this direction, but local groups and NGO's are constantly lobbying the legislature for increasing funds to help local farmers become sustainable agriculturists.

The second barrier (technology availability) is being overcome in a variety of ways. First, NGO's like ARBOFILIA are using trained volunteers to help teach area farmers about sustainable methods (Knight, 1992). The Programa de Diversificación near Turrialba is a similar program. Hein (1989a) explains that some of the new agricultural ideas show farmers how to raise sustainable crops for export. He lists spices, nuts, medicinal plants, cacao, and natural coloring plants as small farm crops with increasing international demand. Costa Rica's universities also

are playing a lead role in researching, publicizing, and offering training in pesticide-free farming and integrated pest management (IPM). Recently, the University of Costa Rica has been actively exploring organic farming options through its experimental program TEPROCA. In this program, IPM experiments with frogs are proving successful to control insects and chicken manure is being touted as an effective alternative to chemical fertilizers (Weinberg, 1991). Having research organizations headquartered in the country has been another useful source of training dissemination. The OTS, TSC, and especially CATIE have had on-going training programs (in conferences and in the field) to advance new ideas.

What Brenes Castillo has labelled a "lucrocentric"* propensity of the Legislative Assembly (favoring large industry and corporative agriculture) is being surmounted by a different grass-roots approach. To counter the influence of the large companies and to join together in a united front, many small-scale farmers have formed agricultural unions and co-operatives. These unions strongly promote natural fertilizers, sustainable crops, and the elimination of agrochemical dependency (Campos, 1989). They also press the government for tax incentives, professional training, and market expansion for local crops. Strongly agreeing with this approach, Luis Fournier (1981) suggests that fomenting new

* Ingemar Hedström (1988:248) defines "lucrocentrism" as "the affinity for modern societies to dominate nature and convert its ideals into a thirst for wealth and irrational development." The result of this mentality, she states, is "the pauperization of the majority of the population [and] the degradation and contamination of nature."

markets for locally grown renewable products is a realistic step the government must take.

One of the larger of these organizations is UNSA (the National Agricultural Union). It has been vocal in its efforts to get national attention and government support, and in 1980 staged large protests in San José (Barry, 1991). UPAGRA (the Atlantic Coast Agricultural Co-operative), a small-scale farmers' union, has also led protests to seek support for sustainable development and against chemically dependent big agriculture (Campos, 1989; Weinberg, 1991). APROADAP is a campesino co-operative comprised of "agroforesters for agricultural diversification" and there are several other unions as well (Brenes Castillo, 1989). Weinberg (1991) observes that these local groups recognize that conservation and wilderness management are also integral facets of sustainable use.

The campesino movements likewise are addressing the fourth barrier, cultural opposition based on subsistence agriculture. Indigenous tribes historically have been rooted in traditional agricultural practices based on a subsistence model. Actually, instead of a barrier, Indian methods are an earlier contribution to sustainable agriculture. William Soto believes that the current agricultural dilemma "demands that we look not with nostalgia, but with respect and a clear sense for the future at how Costa Rican indigenous cultures solved the problems of survival" (as quoted in Bozzoli de Wille, 1986:6).

The problem is that native tribes have been forced to acculturate into an Iberianized Costa Rica. Left without many of their traditional lands and natural resources, some tribes cling to subsistence methods which are not proving sufficient for life in contemporary Costa Rica. UCR anthropologist María Bozzoli de Wille (1986:8) argues that

the Indian no longer can make use of his environment in the way passed down from his ancestors; his lands are completely dominated by systems which treat the environment differently than the traditional indigenous ways.

Thus, some tribes have sought help from the campesino unions and are experimenting with agricultural changes (Brenes Castillo, 1989). The Costa Rican government, via CONAI, has not been consistent in its help to these native peoples. In an interview with Dr. Bozzoli de Vargas (formerly de Wille), the government's policies towards Indians were called "ambiguous--sometimes helping the Indians and sometimes not."

The efforts mentioned here deal with the development of sustainable agriculture on a small-scale basis. The four inherent barriers analyzed herein are small compared to the challenges facing Costa Rica on how it will deal with large-scale development of monocultures. But the framework or mechanism is in place (both through an environmentally conscious public and the grassroots support of NGO's and agricultural co-operatives) to seek ways to ensure the long-range sustenance of the country. Also the government has provided hope for its improved involvement through its monumental National Conservation Strategy for

Sustainable Development. One of its fourteen sectors deals specifically with agriculture. Whether the government will take the active courage to implement the recommendations or whether they will remain on paper and in files is yet to be seen. RENEM's Eric Ulloa, however, assured that one of the "new criteria" of sustainable development is "to create protected areas where the people living there will not be expelled" and to help them develop an economic base using the local natural resources. The importance of these ideals is cogently seen

. . . not only out of professional necessity, but of the necessity of having life triumph over death, so that future generations will be guaranteed a society whose culture will be one of co-habitation with nature and with a highly participatory character, with great power of the rural population, and which will construct a democracy for life (Brenes Castillo, 1989:173).

Environmental Education: Protection for the Future

Environmental education has surfaced as an indispensable instrument to create conscience and to internalize our conduct, attitudes, and capacity to make decisions for the rational and creative management of nature's resources.

- Estrella Guier (1982:63)

History and its lessons are dynamic. To learn from past experiences and to plan for the changing needs of the environment, Costa Rica has implemented a strong educational program. Environmental education, according to State Extension University professor Estrella Guier (1982:65), seeks to understand "the balance between the natural environment and that which was created by man." In Costa Rica, this has become an "innovative" process "oriented toward the solution of concrete problems . . . [and] serving as a link between social and natural sciences, which traditionally have been taught in a totally isolated form" (*ibid.*).

While the independent (and often recondite) study of and instruction in Costa Rican natural history and biosystematics can be traced to the middle of the nineteenth century, environmental education is a relatively recent addition to the curricula of public schools and universities. Article 2-j of the Ley Forestal (1969:908) provides for MAG to establish continuing education on the importance of forest resources, but schools and universities have had to develop their own guidelines for the instruction of the broader and more interrelated concepts of environmental education. Guier (*ibid.*) refers to this as an "integrated approach" for the "environmentalization of the curriculum." She adds that

this is [defined by] the conceptualization of environmental education as the integrating axis of other disciplines. . . . In other words, the environment should be considered with a holistic perspective where each variable should be considered within a total context, and forming a scheme of interactions. The fundamental characteristics of each environmental situation can be defined as multi-, inter-, and transdisciplinary.

A variety of programs has emerged in Costa Rica to address the need for an integrated approach to environmental education. The University of Costa Rica's School of Biology emphasizes the instruction of applied ecology and teaches a variety of different biological disciplines (Fournier, 1981). UCR maintains a tropical forest field station to allow students hands-on experience with research projects. Its School of Agronomy deals with environmental issues in agriculture and sustainable development.

The National University (UNA), located in Heredia, offers a more specifically integrated program through its much respected School of Environmental Sciences. According to one professor there, the school was established in response "to the urgency of educating the public which forced conservationists to discuss environmental themes and to give [them] dimensions of totality" (Quirós, 1989:309). With grant assistance from CONICIT, the school especially has been involved in researching forest and marine science issues. UNA has tried to fill an historic void in Costa Rican research on marine biology and maintains research stations in coastal areas (Gómez and Savage, 1983). The School of Environmental Sciences also offers degrees in wildlife management

and is a leading institution for the identification, study, and protection of endangered species (Fournier, 1991).

The State Extension University (UNED), in collaboration with the conservation group ASCONA, founded the Program for Environmental Education in 1977. Mario Boza was its first director. This program grew out of the "emerging necessity for younger generations to study the relationships of their surroundings, [and] to create a conscience and an ability to confront the problems that they generate" (Guier, 1982:62). The program is bent on developing curricula, literature, and audio-visual aids which can be transferred to classroom settings for a wide range of age groups (Fournier, 1983; 1991). It has enjoyed popular support and high enrollment of Costa Rican students (Boza and Mendoza, 1981).

Another UNED entity is the Center for Environmental Information and Documentation (CIDA). Created by the Carazo administration, CIDA is a joint function of UNED and the National Park Service. Its principal function is the gathering and documenting of information regarding Costa Rica's natural resources and the environment in general. It provides a data collecting and storing service which is used for environmental assessments, industrial planning, and research and educational projects (Guier, 1982; Boza, 1984).*

* CIDA is in some ways similar to InBio (the National Biodiversity Institute), which, because of its private status, different focus, uniqueness, and need for in depth analysis, will be discussed separately in Chapter VI.

Costa Rica's Institute of Technology also is actively involved in educating students for environmental management. It is primarily an engineering school (which deals with industrial planning and environmental pollution) but also has a Forestry Engineering Department which teaches students about environmental silviculture (Calvo, 1990).

Integrated resource management and environmental education are taught at the internationally (and United Nations) supported University for Peace, which is near Ciudad Colón. The brainchild of former president Rodrigo Carazo, the University for Peace was established in 1980 to teach students from all over the world the ways of non-military conflict resolution. It also has an environmental focus. It is located on 700 acres of primarily forested land, 500 acres of which are to be preserved as virgin forest for its aesthetic value and scientific study (Bird, 1984). The current chancellor is Robert Miller, formerly of the U.N. Environmental Programme, who is committed to a conservation curriculum. The relation between peace studies and environmental studies is addressed in the University's Basic Documents (1981:53):

One of the problems which more notably affects international and national peace is that of natural resources. This is the starting point of some of the main problems of misery, injustice, and social tension. . . . [T]he relation between natural resources and population, sources of food and energy, and the conservation of the natural habitat, we consider . . . interrelated and must be approached together within the same area.

Environmental education in Costa Rica is not limited to the college level. The Ministry of Public Instruction is involved

with disseminating environmental curricula to elementary and secondary schools. Based on his work entitled "Preliminary Considerations for the Elaboration of a National Environmental Education Plan", Orlando Hall developed the Center for the Improvement and Teaching of Sciences (CEMEC) within the Ministry and funded in part by CONICIT (Guier, 1982; Fournier, 1991). CEMEC not only promotes the instruction of sciences, but also helps public schools educate people to know more about the care of their tropical environment.

Other youth programs in environmental education exist. One of the more noteworthy ones is the National Youth Movement's involvement with SPN in ecological projects, education, and maintenance of national parks and forests (Salcedo and Leyton, 1980; Weinberg, 1991). Mario Boza (1984) shows that information about, and visits to, national parks are part of the official programs of Costa Rican elementary and secondary schools. The Tico Times recently reported that one high school in Costa Rica, the Liceo de Alajuita, formed an Ecology Club, the first of its kind in the nation, and has informational programs and environmental service projects (Sheaff, 1992b).

Other Costa Rican media are utilized in the environmental education of the country. What Hein (1989a:274) calls a "proliferation of environmental literature" includes a host of journals and magazines that is flourishing in Costa Rica. The principal ones are Biocenosis (publication of UNED's Program for Environmental Education), Brenesia (publication of the National Museum), Zurqui

(periodic environmental supplement to the daily newspaper La Nación), Agronomía Costarricense, Revista de Biología Tropical, Tecnología en Marcha, and Turrialba. A myriad of nature guides, national park books, and wildlife literature abounds in book stores and endangered species posters are seen everywhere.

The newspapers themselves play an important role in keeping abreast of environmental issues and informing the public. La Nación, the Tico Times, and others have regular "ecology-friendly" features and columns. Costa Rican television has many programs that deal with wildlife and nature. One station, Channel Six, proclaims itself the canal ecológico (the ecology channel) and almost exclusively features environmental programming. RENEM even maintains a national telephone "hot-line", called Teléfono Ecológico, which citizens may call twenty-four hours a day to be updated on various environmental issues and to report abuses they observe.* Its motto is "El bosque, patrimonio del futuro" (the forest, heritage of the future). Another commonly seen environmental slogan on billboards, buses, and bumper stickers is "Naturaleza, Belleza, y Paz: Todo en Uno--Costa Rica" (Nature, Beauty, and Peace: All in One--Costa Rica). There are other public and private campaigns to encourage recycling ("yo reciclo, y usted?" / I recycle, do you?) and to control pollution and litter ("no a la contaminación" / say no to pollution).

Government proclamations of special days and weeks are a final way to be mentioned here that are used to educate, inform,

* The number is 21-84-84.

and alert the public. Arbor Day has been used for decades to encourage reforestation. As early as 1950, the government declared a National Week for the Conservation of Natural Resources. June Five has been named the "National Day for the Environment" and this year (1992) it was honored as "World Environment Day" to correspond with the Earth Summit taking place at the same time in Rio de Janeiro. Many Costa Rican boy and girl scout groups marked the day by planting trees in deforested areas. The media gave special attention to environmental issues.

Overall, the urgency to have an informed citizenry in Costa Rica has prompted a robust emphasis on environmental education. Former President Carazo has stated that "the language of education is very strong" (personal communication 1992), and so it has been in terms of helping to stimulate an ecological conscience. Luis Fournier (1983:198) recognizes this link when he writes:

The objectives of environmental education are fundamentally oriented towards forming a conscience among Costa Ricans that we are part of a complex environment, and that our survival depends on our use of the environment and natural resources.

While the criticism against Costa Rica's system charges that its environmental education is diffuse and often voluntary (see Brennes, 1984), the conservation record speaks for itself and the framework is in place for future environmental successes. Gerardo Budowski (1982:167) agrees:

The system of public education in general, supported by excellent publications and audio-visual aids, has left a profound mark, and all of these have added to the growing conscience of the people regarding the importance of their wild areas.

VI. From National Parks to National Conscience

The traditions of tropical conservation in general, and certainly in Costa Rica specifically, have to evolve with urgent haste to a mode where the integration of the park into the social consciousness is dominant and central to the entire plan.

- Daniel Janzen (1986b:13)

Which came first: did a national environmental conscience lead to the development of national parks, or did national parks serve as a catalyst for the development of an environmental conscience? This chicken or egg question can be analyzed only in light of Costa Rica's evolutionary conservation history and probably would not differ greatly from its avian phylogenetic counterpart: it evolved over time from a simpler form with periodic mutations along the way.

That Costa Rica's geographic and historical uniqueness shaped the unfolding pattern of conservationist thought in the beginning does not account for the surge in environmental awareness experienced in the last twenty years. It explains its background and indeed was a germ in its formation, but another element was surely at work to nurture its rapid growth. Gómez and Savage (1983:10) believe that ecological improvement occurred through

the changes in Costa Rican national attitudes in the past two decades, the dedicated young biological scientists and conservationists who have helped in developing the nation's environmental consciousness, and the emerging national concern for basic knowledge of the environment and its biota coupled with planning for the benefit of both man and environment.

But the reason that "the past two decades" is so frequently cited

in the literature is because of that threshold legislation from 1969--the Ley Forestal which established the base to create national parks. Wolfgang Hein (1989a:273) opines:

. . . the development of environmental institutions and policies in Costa Rica corresponds to the growth of a conscience for ecological problems. . . . With the exception of a few isolated measures, it can be stated that the country's environmental policy began with the establishment of the National Park Service in 1970.

It was destined to be a cyclical phenomenon. Once parks were created they became "a source of pride for the majority of Costa Ricans" (G. Budowski, 1982:167)--whether they necessarily visited them or not--which in turn inspired them to demand more protected areas and other environmental policies (Hein, 1989a). One of the ways this was accomplished, even in the early years of park designation, was to teach the visitors as much as possible about the park environment. Publicity via the national media and visitor centers at the parks themselves were "a tremendous success in our country" (Boza, 1974:189). In his contribution to the 1982 Symposium on National Parks and Biological Reserves entitled "National Park Interpretation: a Direct Form of Creating a Conservationist Conscience", Douglas Cuillard (a U.S. National Park Service liaison to SPN) emphasized that creating a conscience is the most important mission of the national parks. Echoing Boza, he said that interpretive facilities (e.g. "visitor centers, exhibits, hiking trails, guided nature walks or . . . virtually any planned activity intended to transmit the citizen's relationship to the parks"), television and radio programs, travelling exhibits,

movies, and newspaper articles are "all understood by the public and are the best investment SPN [made] to create a conservationist conscience" (Cuillard, 1982:121). Special emphasis was placed on acquainting the people who lived near the parks with the parks' resources. The Peace Corps "organized trips into the parks for local residents to develop support [and] to encourage the parks' recreational activities, like hiking, sightseeing, etc." (Koepsel, personal communication 1992). Estrella Guier (1982:68) stated that these plans were a way "to fortify" the national parks and a way "to project themselves into the nearby communities." Agreeing with that judgment, Susan Place (1988:47) affirms that "local participation from the beginning of conservation projects is critical to their success."

None of these was an easy task. In a country agriculturally steeped for centuries in a "European mentality for deforestation, there was much legislative and community opposition" (Carazo, personal communication 1992). Mario Boza (1974:183) claimed

this program was developed despite a persistent shortage of funds and of qualified personnel, and in the face of the belief, which most of the country originally shared, that nature conservation is a superfluous activity.

And years later, many of the parks and protected areas that were established "went relatively unnoticed and even caused resentment in certain private and public sectors" (G. Budowski, 1982:166). However, little by little (and with the strong efforts of the environmental education movement and the NGO's) much of Costa Rican society came to accept and support conservation. By the

mid-1980's many Costa Ricans had become "patriotically proud" that their nation was becoming a world leader in tropical conservation, even though many were not really "familiar with the parks themselves" (Koepsel, personal communication 1992). This kind of "soft support" (ibid.) resulted from a growing environmental conscience even if it did not always lead to nationwide bandwagon activism for policy reform (A. Morris and Olsen de Figueres, personal communications 1992).* Another report confirms that national parks should and can play a "dynamic and essential role that transcends park borders" in the on-going environmental education of the nation (Guier, 1982:61). An active example of this concept is the government's program to use school children in protected areas. Weinberg (1991:123) comments that this program "enlists student volunteers in the protection and maintenance of national parks [and] as a result, the young people frequently become advocates of tropical forest conservation."

* An example of where it did, however, was with the Palo Verde NP scandal when public outrage supported ASCONA's suit against President Carazo to restore the territory that had been severed from park designated land (Bonilla, 1985; Hein, 1989a). Bonilla calls Palo Verde "the park of public support." Hein also shows where public outrage was instrumental in correcting government demarcation errors with Corcovado NP in the late 1980's. Their research nevertheless shows that most of these efforts (letter writing, etc.) came from an informed sector of Costa Rican society and from the international scientific community. Barry (1991) mentions that university students have at times proven helpful by their demonstrations and demands for environmental conservation. He cites, for example, the Alcoa Mining Company controversy of the early 1970's when student activism was effective in preventing new mining operations to develop in ecologically sensitive areas. The oleoducto project also was halted largely due to public opposition.

The SPN has been an untiring leader in these efforts. Its successes with park development, management, and educational programs were shared in Bali, Indonesia at the 1982 Third World Congress on National Parks (an overt play on words indicating that it was the third in a series of ten-year conferences and that its theme was for encouraging park development in the Third World). Craig McFarland, Roger Morales, and Jim Barborak (of CATIE and later of SPN) presented a paper entitled "Establishing, Planning, and Implementation of a National Wildlands System in Costa Rica" and Gerardo Budowski and McFarland presented a "do's and don'ts" strategy plan for conserving areas in the "Neo-Tropical Realm" (see McNeeley and Miller, 1984).

Likewise, government agencies seem to practice what they preach. Both RENEM and SPN recently relocated their offices to buildings which used to be a ten story hotel and adjoining house near the heart of San José--saving millions of dollars and conserving resources that would have gone into the construction of new facilities. The DGF is headquartered in a large, remodeled warehouse style building in Tibás (a San José suburb) and has offices, work areas, and conference centers. Tactfully placed signs in national park areas remind visitors of their environmental stewardship. Examples include: "Costa Rica es nuestra casa, ¡no la ensuciamos!" (Costa Rica is our home, let's not pollute it!), "¿Refleja su comportamiento diario esta responsabilidad?" (Does your behavior reflect your responsibility every day?). Concerning endangered species, one read "Pero, ¿por

cuánto tiempo mas?" (But for how much longer?) and a sign at the SPN offices said "¡Quedamos pocos, muy pocos . . . protegemos!" (We are left with few, very few . . . let's protect them!).

Lest the ideals immortalized in these actions and words become stale, Daniel Janzen (1986b:13) proffers the following advice for reminding a nation of its conscience for the wise use of natural resources that in a large way stems from national park development:

It is traditional . . . to identify biologically important habitats, obtain title, fence and patrol them and view the task as largely complete. Such an act is functional if society at large is pre-programmed to recognize the jewel thus bestowed upon it. . . . If not, and this is the general case in tropical conservation, the story is only halfway through the first chapter of a long book. Those areas we view today as endangered are probably already extinct, and those we view as securely preserved are at best on the endangered list. They will remain there until they are viewed in the same breath as churches, libraries, and democratic government.

Two ways in which the parks and protected areas in Costa Rica are working to demonstrate this objective, and at the same time educating the public and helping to 'pay their way', is through nature tourism and through understanding (and sometimes marketing) the organic diversity found within them. These will be the topics to be discussed in the subsequent two sections.

"¡Oro Verde!": Ecotourism for Economic Growth

"Yo visito y apoyo los parques nacionales, ¿y usted?"
(I visit and support the national parks, do you?)

- bumper sticker seen on a car in San José

Tourism is definitely one of the multiple use concepts under which Costa Rican national parks and protected areas are managed. While restricted access is still a fundamental tenet of these management plans, the parks and reserves are open to the public. Mario Boza (1984:6) explains that "the parks constitute the base of ecological tourism and of scientific research, activities that have increased considerably in the last ten years." This ecological tourism, or ecotourism, is defined by Tamara Budowski (1990: 75) as

an affinity to study, admire, and enjoy the scenic beauty, the flora and fauna, and the cultural aspects found in these areas. [It] implies a scientific, aesthetic, or philosophic appreciation without having to be a professional scientist, artist, or philosopher. The main point is that the ecotourist has the opportunity to be in contact with nature in a very different form than he [or she] does in a routine, urban setting. Eventually, this person will convert his [or her] appreciation of the areas to an active involvement in the conservation of nature.

In her article "Ecoturismo a la tica", T. Budowski (1990) goes on to explain that currently this type of tourism primarily involves foreign tourists who are "baby boomers", "yuppies", and "DINKS" (couples between their twenties and forties with double income no kids) but is fast expanding with retired adults. Likewise, national park use is becoming more popular with Costa Ricans, although T. Budowski admits that the visitors come from a well educated, middle or upper class segment of society. An earlier

study (Place, 1988:47) shows that "the majority of visitors to most Costa Rican national parks are, in fact, Costa Ricans" which reflects their "increasing domestic interest in environmental issues and conservation of the country's unique biological endowments." Records at Tortuguero NP, for example, reveal that from 1980 to 1985 2,850 Costa Ricans visited the park cf. 2,600 foreigners (ibid.).

Ecotourism for Costa Rica has translated into an economic boon. In the twenty-two short years since the first national park was inaugurated, tourism has replaced coffee as the number two industry--behind only bananas--in generating national income (Carvajal, 1992:24). Referred to as the "industry without chimneys" (Fournier, 1981:44), ecotourism in 1992 is projected to bring in approximately \$500 million (based on its \$110 million from this year's first trimester) (Carvajal, ibid.). The most visited site, which receives 20,000 visitors a year (Weinberg, 1991:122), is the Monteverde Cloud Forest, one of the last homes on Earth for the resplendent quetzal (Pharomacrus mocino).^{*} Barry (1991) and many others also attribute the increase in tourism to Costa Rica's political well being in an otherwise unstable and war-torn region. This kind of capital influx into Costa Rica,

* Weinberg explains that while Monteverde is privately owned by the TSC but open for public access, the number of tourists is threatening its environment. The TSC, World Wildlife Fund and the Nature Conservancy therefore are lobbying to create an Arenal NP contingent with Monteverde. Part of the fees and donations collected at Monteverde is being used for this purpose and for the development of the nearby Bosque Eterno de los Niños--the Children's Rainforest (T. Budowski, 1990).

currently being called oro verde (green gold), was the hope of people like Luis Fournier (1981), Mario Boza (1984), Rodrigo Carazo and Eric Ulloa (personal communications 1992) and many others in the conservation community, to make the parks and preserves become self-supporting and an asset to the general economy and therefore more widely accepted amongst the public. The director of SPN, Álvaro Ugalde, claims one of his most important roles "is to convince the legislature that national parks will be a great help to the economy" (personal communication 1992).

The goal, according to Rodrigo Gámez (as quoted by Christian, 1992:A6), is "to make the conservation idea attractive to those Costa Ricans who fear that conservation would inhibit their economic prospects." In her study on the impact of national park development in Costa Rica, Susan Place (1988:47) addresses how this goal might be accomplished: "[Tourism] must be organized in such a way that a large number of local people benefit from the influx of tourists rather than merely bear the burden of its costs." Some residents living near Tortuguero NP at first experienced a general decline in their standard of living when the park was created due to less available farm land, firewood, and game meat, Place reports. Over the years, however, the economy of the area as a whole has increased through "tourist trickle-down" businesses (ibid.). "As a result", Place (ibid.:51) concludes, "both the people and the environment may face a more secure future." Eric Ulloa at RENEM refers to this as "arriving at a central line" between the long-range advantages to the environment

and the economic benefits to local communities (personal communication 1992).*

The national parks in Costa Rica are different from their counterparts in North America, Europe, or Africa. Young (1981) points out that parks in Costa Rica are not used as vacation spots in the same way they are in the United States, have far less human intervention, and support much more scientific research. Weinberg (1991:109) discusses how many of the parks and preserves are difficult to reach, entailing "hiking tens of kilometers over unpaved roads" (pure mud during much of the year). Most of the wildlife preserved in the parks is nocturnal and never seen by visitors--unlike the charismatic megaspecies easily viewed in places like Yellowstone, the Galápagos, Kenya or Tanzania (T. Budowski, 1990).

Despite the boon for conservation and the economy, environmentalists are concerned with "oversell" (ibid.). While all tourist visitors should be actively involved with helping to preserve the pristine nature of the parks (Boza, 1984), there is a need for planning and guidelines. According to Fournier (1981) some protected areas (e.g. the fragile ecosystem of Cahuita NP) would completely deteriorate with intensive human impact. The Tico

* The parks themselves rarely employ many locals as guards or wardens in fear they might allow friends and relatives to poach (Place, 1988). They do create jobs for others from different parts of the country, however, with resultant spin-off benefits to the local economy. Some Costa Rican conservationists believe that more locals should be involved with park administration and management to enhance public relations and increase local support for the projects and parks themselves (Gómez in Christian, 1992).

Times recently reported that tourism is becoming the "the goose that laid the golden egg" since the government still has no comprehensive management plan for tourism and some places like Manuel Antonio NP are becoming seriously overcrowded (Carvajal, ibid.). The ICT's aggressive "Escape to Paradise" advertising campaign in the 1980's brought thousands of foreign tourists "seeking a peaceful tropical nirvana" (Barry, 1991:81).

Costa Rica's rich coasts likewise are attracting thousands of tourists a year. Environmentalists are worried that shorelines will become littered with cheap hotels and beach bars like those of Spain, Portugal, or Mexico. Their fear is grounded in the fact that "only seven percent of Costa Rica's coastlines have any kind of regulatory plans" (Carvajal, ibid.).

A new dilemma developing is the recent surge in privately (often foreign) owned rent-a-parks. Barry (ibid.) reports that some areas charge visitors up to seventy five dollars a day which precludes use by most Costa Ricans. Fencing in these private reserves worries conservationists, but the government to date has not regulated the industry and supports the influx of capital it brings. Sheaff (1992c) exemplifies the problem by exposing how one such foreign enterprise, a resort in Puntarenas Province called "Ecodesarrollo" (Ecodevelopment), owned by Canadian businessman Maurice Strong--who is curiously the same individual who brainstormed and organized much of the environmental World Summit in Brazil in summer 1992!--failed to check adequately (or ignored) property lines and began to construct resort facilities

on the Keloldi Indian Reserve and on the adjacent Gandoca/Manzanillo National Wildlife Refuge.

To confront the issue of appropriate travel and visits to the country's wild areas (both on an individual and national basis) the Costa Rican Audubon Society has issued an eight point Code of Environmental Ethics for Nature Travel (see Blake and Beecher, 1991). The group is advocating responsible visitation with the overall goal of minimizing human impact. Travel and tourism agencies in the country are promoting this code and encouraging violations to be reported.

Promoting nature is an "unsubstitutable capital" resource for Costa Rica (Bonilla, 1985:135). But while it is insufficiently regulated now, the visible benefits to education, enjoyment, conservation, the economy, and as a vehicle to instill a sense of environmental conscience can be the products of ecotourism. A balanced approach is incumbent for an ecologically successful program, and Tamara Budowski (1990:89) concludes that "many people believe that if Costa Rica cannot, then no country will be able to succeed in . . . having tourism and conservation co-exist."

The National Institute of Biodiversity

Once again Costa Rica has emerged as one of the world's leaders in tropical conservation.

- Peter Raven (as quoted by Tangle, 1990:633)

In analyzing the conservation history of Costa Rica, it is fitting to conclude with a brief discussion of the most recent addition to the environmentalist make-up of the country: the

Instituto Nacional de Biodiversidad (National Institute of Biodiversity) or INBio, as it is commonly known. A discussion of this unique institution is included here because it is a direct result of the use of national parks and forests in the development of a national environmental conscience. In this case, the conscious protection of natural resources for the future environmental stability of the country starts with knowing (and understanding as much as possible about) exactly what organic resources exist.

According to an INBio brochure, the institute was planned by a commission established by President Óscar Arias in June 1989

to specialize in understanding and helping society use . . . Costa Rica's extraordinary biodiversity. There are at least a half million species of organisms in Costa Rica . . . however, we understand only a minute fraction of these species. What they eat, what they do and how they do it, [and] how they can fit into the agroecosystem diversification that Costa Rica must sustain, are unopened books written in strange languages. . . . By understanding biodiversity, we can protect it, manage it, and help society use it. . . . In this manner we confront the gravest threat of this century and the next--the potential loss of tropical biodiversity. Simultaneously we promote the growth of a society whose ethical and moral values are rooted in the respect for nature and the wise management of natural resources.

The need to inventory biological resources for improved resource management in Costa Rica has been advocated often (Salcedo and Leyton, 1980; Fournier, 1983; Hall, 1985; Fundación Neotrópica and Conservation International, 1988). That Costa Rica has developed a way to do this, the first tropical country in the world to do so, speaks to its sincere determination to secure the environmental welfare of the country.

To accomplish this goal, INBio was established as a private organization as recommended by the Arias interinstitutional commission. The INBio brochure explains that

[t]he current framework of government structures did not seem appropriate for many of the INBio tasks--such as the magnitude and complexity of the inventory, the publicizing of Costa Rican biodiversity, the urgent demand for speed, and the critical need for a flexible organizational structure designed for the task.

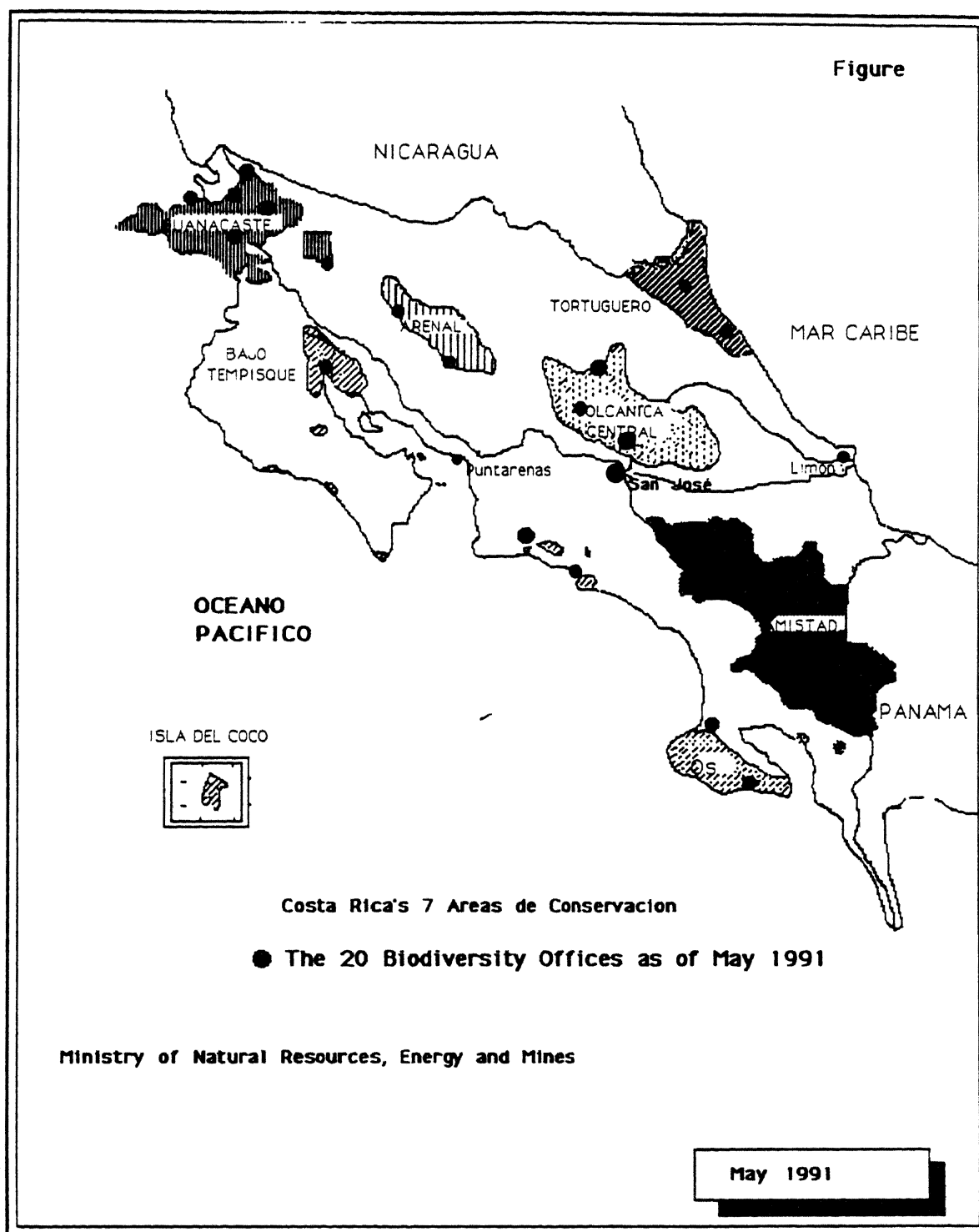
Hence, in October of 1989 the INBio Association was legally registered with an Assembly of Founders and a Board of Trustees. The board hired former UCR botany instructor and Fundación Neotrópica president Rodrigo Gámez (who earned a doctorate in plant pathology from the University of Illinois) as INBio director. A large facility to house the institute and to perform laboratory and data storage operations was built in Santo Domingo, northwest of San José. A visit there in June 1992 revealed a busy, working, but amazingly clean and efficient atmosphere. Staff members were friendly and eager to share about INBio's activities.

Rodrigo Gámez has been an outspoken and well publicized proponent for INBio. Maintaining that "preserving areas does not guarantee perpetual conservation" (Gámez, 1990:3), he shows that the environment will only be protected by a "multiparticipatory effort . . . conducted by the people responsible for and expected to benefit from the conservation of their own biodiversity" (Gámez, 1991:377). To put this belief in motion, Gámez developed a three point credo for INBio: save biodiversity, know what has been saved, and put it to work for the improvement of society (*ibid.*; Wille, 1991:15).

Biodiversity was being saved long before the creation of INBio. Costa Rica's system of national parks and equivalent reserves has saved countless species from the extinction records. INBio, however, seeks to inventory these species and preserve representative voucher specimens of each. It uses the national parks and forests to find these species and has developed twenty biodiversity field offices to aid in their processing (see Figure One). The institute hopes to stem the tide of species endangerment in Costa Rica, which according to the Fundación Neotrópica and Conservation International study (1988:5) includes 157 "critically endangered" species, 325 "very threatened" species, and 278 "rare and vulnerable" species. Costa Rica was the first country in Central America to be party to the CITES treaty on listing and prohibiting the taking and trafficking of endangered species in 1974 (Fuller and Swift, 1985), but poaching and export have nonetheless continued (Weinberg, 1991). INBio is working to save what is left and to research and publicize the species' interconnectedness with the environment.

The second step, knowing what's been saved, involves what Chris Wille (1991:15) refers to as a "Noah's ark--where INBio is identifying and cataloguing every living thing in the country." Gámez's goal is to have this completed by the year 2000. While this may seem insurmountable, especially considering Costa Rica's small number of field biologists and professional systematists, INBio has developed an innovative program using 'parataxonomists' and local assistants. Parataxonomists are not trained scientists

Figure One: INBio biodiversity stations



(source: INBio office, Santo Domingo, Costa Rica)

but rather university students, government employees, or often individuals who live locally near the wildlands being studied, who become salaried collectors of flora and fauna. They work closely with professional taxonomists and what they collect is processed into the INBio data banks. This system of using lay people to assist in collecting biological data was created by Daniel Janzen in the early 1980's in Guanacaste Province (Joyce, 1991). INBio currently employs over thirty such individuals who are required to take a six month training course in botany, entomology, and ecology (*ibid.*). Wille (1991:15) remarks that these employees "have gathered more species in the past few months than the Costa Rica Natural History Museum had collected in the last century." (For a chart of operations see Appendix 2.)

Insufficient time has lapsed to gauge accurately the success of the third step or goal, but some things are in place to show how saving biodiversity will work for the improvement of society. First, INBio has been an obvious economic boost in employing many scientists, lay parataxonomists, and field assistants. Yet even more economically hopeful is INBio's role in the developing industry called "chemical prospecting". Defined as "the notion that nature can teach chemists a few tricks about how to design drugs" (Roberts, 1992:1142), medical and pharmaceutical research is taking on new meaning through chemical prospecting in tropical nations. Lynn Llewellyn (1990:207) reports that one half of the modern medicines in use today are derived from the natural world with most of those coming from tropical forests. INBio and three

universities (Cornell, Strathclyde of Glasgow, Scotland, and UCR) have arranged a joint research program to identify, study, and experiment with plant and insect extracts and to perform preliminary bio-assays of chemical compounds (Joyce, 1991). Analytical techniques like mass spectrometry and magnetic resonance spectroscopy are then used to determine the extracts' chemical structures for their possible pharmaceutical values. The arrangement is that INBio will receive a sixty percent royalty from any such patentable compound or a fifty-one percent royalty from a compound that requires significant chemical modification (ibid.). INBio, in turn, will release all profits generated through this program to conservation causes in Costa Rica.

Much of this plan was originated by Thomas Eisner, a chemical ecologist at Cornell University and one of the world's foremost researchers of tropical medicines. Eisner believed that if pharmaceutical corporations could join up with tropical countries both sides (and mankind in general) would benefit. One such company that agreed is Merck & Company of Rahway, New Jersey. Currently Merck is paying INBio one million dollars over the next two years for the opportunity to search for drugs that could cure Alzheimer's disease, high blood pressure, AIDS, and other maladies (Roberts, 1992:1142).^{*} In addition, Merck donated \$135,000 in chemical extraction laboratory equipment to INBio and sent

^{*} Interestingly, Merck's research and development budget of one billion dollars is the same as the entire operating budget of the Republic of Costa Rica.

chemists there to help train INBio staff. The money generated by Merck thus far has been turned over to RENEM for support of a marine park at Coco Island (ibid.).

Thus Gámez is realizing his three point goal. To finance such an undertaking required government assistance and outside help. Initial support came from the Central Bank of Costa Rica, U.S. AID (which also financed the second parataxonomy project through the efforts of AID tropical ecologist Gary Hartshorn), the MacArthur Foundation, the Swedish government, Pew Charitable Trusts, and other foundations. Money from Merck also supports administrative costs. (See Appendix 3 for a breakdown of INBio's budget.)

Generating money for research is certainly another INBio advantage. According to Gámez, National Museum personnel were at first "horrified" about chemical prospecting, but warmed to the idea in view of the economic benefit (as quoted in Joyce, 1991: 38). Microbiologist Anna Sittenfeld, who heads INBio's biodiversity prospecting division, stated:

The idea is to create alternatives for economic development, and alternatives for jobs. Then there will be less pressure against the land that is now protected [and] benefits will accrue even if the prospectors fail to find a billion dollar drug in the rainforest (as quoted by Roberts, 1992:1143).*

* Daniel Janzen agrees but warns that "if people say biodiversity has value then it will fall under the social rules that all other things that have value do. You bargain for it, you hide it, you steal it, you put it in the bank. It's no longer the toy of the English rich" (as quoted by Joyce, 1991:39). INBio therefore has established safeguards to ensure companies using forest products do not claim that they are synthetic to avoid paying royalties.

Currently INBio is involved with other on-going projects in addition to biosystematics and chemical harvesting. Staff training, public biological literacy programs, wildlife management, and support for sustained agriculture and forestry are among its priorities (Wille, 1991). Likewise, INBio is serving as a model to help other countries develop a biodiversity survey. Chile and China have made serious inquiries and have visited the institute. U.S. Representative James Scheuer of New York has drafted a bill before the U.S. Congress to establish a biodiversity institute in the United States based on his staff's visit to INBio. (An interview with Gámez for research on this paper was pending but later cancelled as he was preparing for a trip to Italy to share INBio's message there and could not fit in an appointment.) In her research on INBio, Tangley (1990:633) adds: "Amid all the bad news that has come out of the tropics in recent years, Costa Rica stands out consistently as an example of what can work well in tropical conservation."*

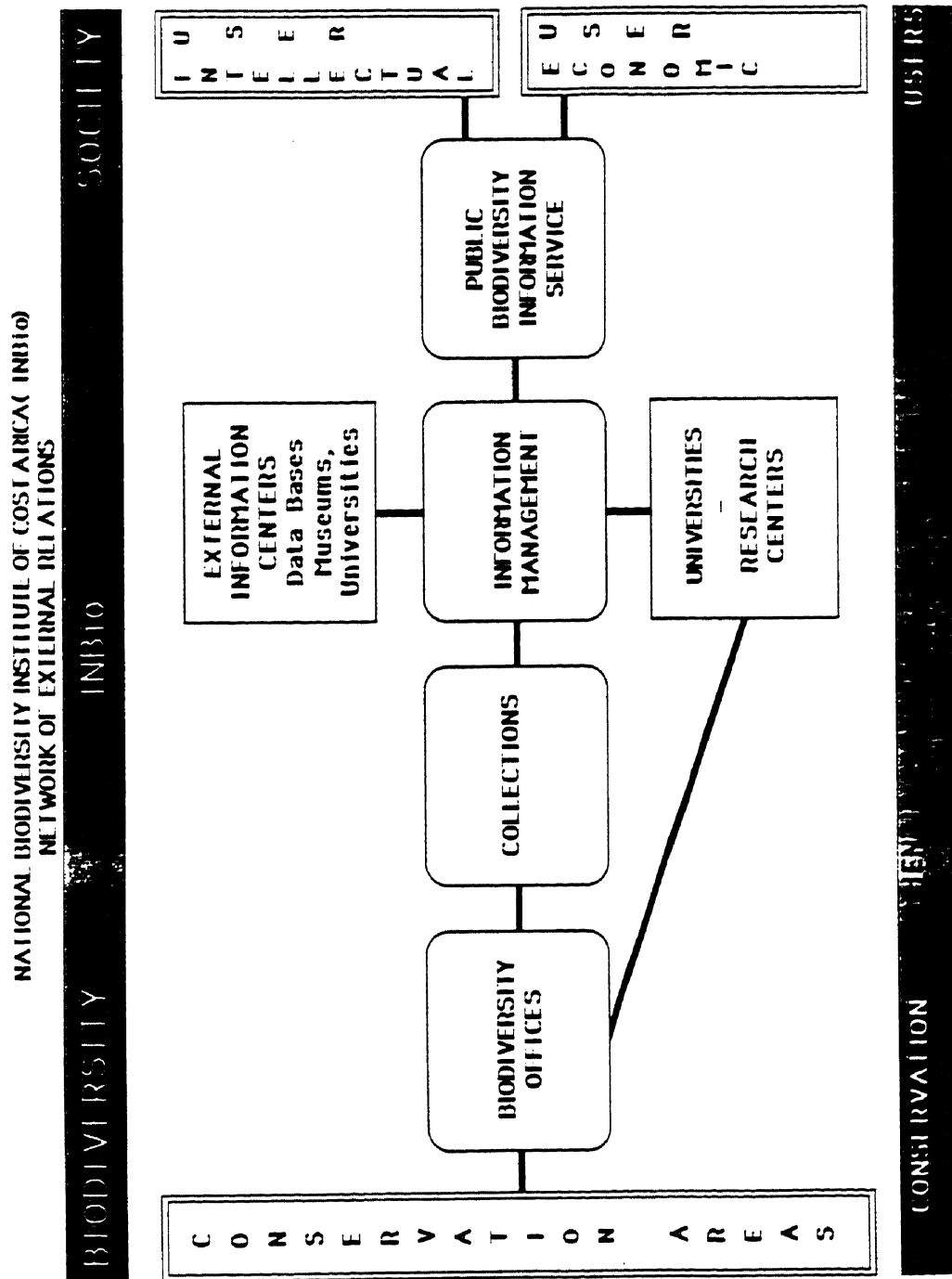
In conclusion, INBio is perhaps Costa Rica's most poignant manifestation of an environmental conscience. The realization that protecting the environment means first knowing as much as possible about it, and then using and marketing that information to benefit the country and pay its own way (without taxing the

* Some specialists warn that the model may not necessarily transfer to all other regions of the world. Costa Rica's stable democracy and commitment to conservation are rare in the tropics where chemical prospecting could lead to resource exploitation and increased degradation of the terrain without profits going to conservation causes. (See Roberts, 1992 for more complete details.)

citizens of the country) is unique to Costa Rica in the tropics and in the world may be surpassed only by Australia (Olsen de Figueres, personal communication 1992). In addition to the economic spin-offs, the information from INBio is disseminated to various centers around the country (see Figure Two) making it available to a wide range of users. In the meantime, Costa Rica's conserved areas are being used developmentally but safely in a manner that gains more public support than fenced off preserves. Christopher Joyce (1991:36) refers to this as a kind of "biological OPEC" in which Costa Rica can control its resources on its own terms. But biodiversity research has implications beyond the borders of Costa Rica. Thomas Lovejoy (1982:160) of the Smithsonian Institution accurately addresses this when he states:

He who supposes that we live on a well explored planet is not only foolish but arrogant; the protection and investigation of our biological resources, especially those located in the tropics, should be an item of high priority on the human agenda.

Figure Two: INBio's network of external relations



(source: INBio office, Santo Domingo, Costa Rica)

VII. Conclusion: "Picking up the Gauntlet"

If we examine the past, it is undeniable that every day a greater number of Costa Ricans, as well as foreign residents in the country, are picking up the gauntlet. What this tells us is that more persons are contributing to the forging of a better Costa Rica for this and future generations, as well as undertaking the role that corresponds to a civilized nation, resolved to safeguard its natural heritage and extraordinary culture, on this little piece of planet Earth.

- Gerardo Budowski (1982:168)

The fact that this thesis became a larger project and longer paper than originally was conceived is testimony itself to the multidimensional history of conservation in Costa Rica. Research revealed that it was the combination of the country's unique biogeography, legacy of scientific inquiry, and reliance on primarily locally owned and relatively small agricultural units that provided the foundation for development of an environmental conscience. But while this outlook on land stewardship for renewable natural resource use became skewed with the advent of developmental (i.e. capitalistic) export agriculture--not to be omitted or analyzed lightly in a review of Costa Rican environmental history--the nation responded with a conservationist agenda. Rodrigo Gámez (1990:3) attributes the successes since 1969 to four principal factors: the opportunity that Costa Rica had to establish a system of protection "while there was still some time left to save substantial portions of the country from destruction"; the initial "enthusiasm and commitment" of a large percentage of the population; the "stability of an unarmed democracy and

its satisfactory attention to the basic socioeconomic needs" of the people; and "the political support that conservation has received from the five administrations since the system was established." Luis Fournier (1981:33) emphasizes the improvement of higher education (especially at UCR in the 1960's and early 1970's when there was a general paucity in environmental thinking) and "the better dispensation of funds for scientific ecological research." All of this, he adds, created "a better comprehension on the part of Costa Ricans about the practical importance of ecology" (ibid.).*

In tracking the emergence and development of this pattern, this paper has attempted to show how the government and society in general have reacted to environmental concerns and what framework has been created for future environmental protection (agencies, NGO's, education, etc.). But there are pressures on this model that will test its very core. The most pronounced of these is the pressure of growth--demographic and economic.

While the population of Costa Rica historically has been low (and today is approximately three million persons) the rate of growth is what worries social scientists. Jeffrey Leonard (1987: 198) reports that Costa Rica's per kilometer density has reached

* It is interesting to note that while many outsiders view Costa Rica's environmental successes in just twenty years as close to a miracle, Fournier (1981:183) discusses why "it took so long for the country to develop a conscience for the necessity of rational use of natural resources". He cites the large influence of squatters, a lack of co-ordinated planning, the slow development of specialized personnel, and much of the population's belief that the forest could never be depleted.

fifty three persons (the third most dense in the region, behind El Salvador and Guatemala). From 1960 to 1980 the country experienced the most dramatic demographic growth (four percent a year) largely in part to the government's excellent health care and subsequently low death rate (Hall, 1985:99). To stem this tide, the government inaugurated the National Family Planning and Sex Education Program in 1968. With a highly literate and educated population, and despite the official disapproval of the Roman Catholic Church (which counts eighty percent of the population as members [Barry, 1991:63]) this program has been fairly successful; Costa Rica now ranks as having the third highest rate of birth control in the world (just after Singapore and Taiwan) (Hall, ibid.). But everything is relative. Today Costa Rica's rate of increase equates to be 2.7 percent and represents "one of the fastest rising in the developing world" (Carriere, 1991:192).

Of course growth means pressure on natural resources. The link is shown most graphically by Fournier (1991:14) who directly matches population increases with the rate of deforestation. Others (e.g. Calvo, 1990; Carriere, 1991) discuss the long-term disadvantages of spiralling growth to both the environment and the economy. The Hall study (1985:89) posits that Costa Rica could sustain a "population several times larger than the present [if] the paradoxical coexistence of underutilization and overexploitation of the physical environment . . . is not halted". The goal, then, is for balance. Can Costa Rica rise to the challenge as it has in the past? Will the "seductions of the American way

of life", as referred to by Raul Prebisch (1980:87), impede the work for sustainable development?

These and other questions must be addressed by the public and the policy makers in Costa Rica. In fact, they are part of the larger picture of Costa Rica's grand contradiction: the juxtaposition of conservation with destruction. The literature is consistent about Costa Rica's admirable (and much publicized) work to protect one fourth of the country while millions of other acres were being systematically deforested. "Paradise on the brink" (Weinberg, 1991), "ecological contradiction" (Bonilla in Weinberg, 1991), and "environmental myth" (Sheaff, 1992) are the kinds of pat terms so commonly used to describe this ironic condition. Will there be any natural areas outside of parks and preserves by the year 2020? If this is in doubt, is it not then comparatively better that the system of parks was developed? Obviously yes, but are the parks and preserves being managed for protection?

The attitudes of the late 1980's and early 1990's compel answers to these questions. In his comprehensive work entitled War on the Land, Bill Weinberg (1991) identifies serious threats to the Costa Rican conservation model posed by the last two administrations. Seemingly out of character for the usually environmentally and pacifistically supportive President Arias, and against Costa Rican law prohibiting weapons and military maneuvers in national parks, American Green Berets were discovered training Costa Rican Civil Guards in Braulio Carrillo NP in 1989.

The Green Berets were also part of an airstrip construction scandal in an ecologically sensitive area to be protected in Guanacaste NP as part of the Oliver North/Contragate affair. Arias did not allow this to continue and went public with the incident. Also in 1989, Corcovado NP in southern Costa Rica was threatened by a U.S. Corp of Army Engineers "Roads for Peace" project.

Meanwhile, the elections of 1990 had environmental overtones that would set the stage for the next administration. Rafael Calderón, godson of former Nicaraguan dictator Anastasio Somoza and candidate of the conservative PUSC party, was elected president. Calderón supported the gold mining prospectors of the Osa Peninsula that were endangering the wilderness environment of Corcovado NP. Likewise, he was and is outspoken in his support of the agroexport economy. And although he and RENEM director Hernán Bravo worked actively to bring the seat of the World Summit to Costa Rica, what implications will his developmentalist policies have on the fragile environmental future of the country? Perhaps it is not surprising that 'preliminary candidacies' (as they are called there) already have been announced for Calderón's job, including one by José Figueres Olsen of the opposition PLN party. (Former president Óscar Arias' wife is also considering a run.)

Thus, picking up the gauntlet for a balanced, sustainable, and environmentally protected Costa Rica is the agenda for the conservationist community and society as a whole. Costa Rica has an indisputable advantage in the framework that is already in place and that has made dynamic strides in accomplishing this

goal. Its emphasis on protecting wild areas, inventorying biodiversity, and educating the public will reap valuable rewards in the continuing process of protecting the republic. In addition, research must continue and new information must be constantly published (Boza, 1984; Meza, 1988). Existing parks and protected areas should be expanded and improved. New areas (especially in the Talamanca and northern Caribbean Plains areas) and small reserves of fragile environments should be developed (Fundación Neotrópica and Conservation International, 1988). Many sectors of society should be involved in this process. Broad support is a requisite. Parts of society may have to change their traditional views of privately owned and developed land. The economic values of conservation must be further projected into society. Because the "pragmatism of economic man, and especially the pragmatism of the Latin culture" (Gómez and Savage, 1983:10) cannot and should not be ignored in Costa Rica, compromises on the part of environmentalists may have to be made. INBio's Rodrigo Gámez concludes:

The Costa Rican park system has survived so far because three million people have their basic needs met. But what happens when we reach six million? The fact is that a park, in addition to protecting the species, has to be socially viable. And it may be that we will have to sacrifice some of the biodiversity in order for conservation to be more socially acceptable (as quoted by Christian, 1992:A6).

Alexander Bonilla (1985) lists six specific goals for the future: reducing the bewildering bureaucracy that produces redundancy in effort and slows conservation; enforcing management plans that already exist; regulating urban sprawl; controlling slash

and burn farming; eliminating poaching; and reducing dependency on industrial agriculture. Álvaro Ugalde believes "it is just a question of time" in affirming that the mechanisms are established to resolve these issues (personal communication 1992). He added that a change in the currently "weak" legislature would expedite reform. Fournier (1981:15) views with "optimism" the future wise use of resources based on his country's "democratic path" and its "youth fighting for improvement".

Now is Costa Rica's chance. Eric Ulloa stated that "if asked ten years ago, I would have thought there was no future for Costa Rica's environment. Now it has grown very big!" (personal communication 1992). So big, in fact that it is being showcased to the world, especially in terms of national parks, biodiversity, and its role in "international co-operation of environmental issues" (Martin, 1992:5).

The big picture, however, is made up of the sum of its small parts. Man's transformations of his environment must be seen in context of the impact they have had on the different facets of nature that allow his survival (Bozzoli de Wille, 1986). Jay Savage and L.D. Gómez (1983:10) reminisce:

We remember the bright blue skies, the white clouds, the almost black forests on the slopes of the volcanoes, the driving rain, the green complexity of the forest canopy viewed from a mountain slope and our own tininess within the forest's grasp. . . . Can we truly believe that man is so foolish as to completely destroy this special world? We cannot let it be so! For once gone, something special and basic about ourselves will be gone too--and afterward man himself will not survive. ¡Viva Costa Rica!

ACKNOWLEDGMENTS

This thesis is indebted to the visionary people of Costa Rica who have strived with fierce resolve to protect their peaceful corner of the tropical world. The author is grateful to the various individuals who agreed to be interviewed in conjunction with research for this study. They gave willingly and generously of their time (some on short notice) to open their homes or offices to me. A special thanks to Willie Solano (Heredia, Costa Rica) should be mentioned for his professional 'guide-in-training' tour of north central Costa Rica.

Special appreciation goes to the thesis 'team' at the University of Kansas--Dr. Charles Stansifer (thesis director, who has given countless hours of time and advice), Dr. Donald Worster (whose work has motivated me to continue pursuing the study of environmental history), and Dr. Philip Humphrey (whose discussions on biodiversity helped stimulate research for this paper). Finally, a very special thanks goes to Sheri, my wife, for typing and proofing many of the manuscript pages and for her incredible patience and complete support of this project.

s.e., Lawrence, Kansas
(Oct. 12, 1992)

APPENDIX 1

The National Conservation Strategy for Sustainable Development

A. Objectives:

1. To maintain essential ecological processes and life systems
2. To preserve genetic diversity
3. To enhance equity, social justice, and ethical values
4. To develop sustainable utilization of natural resources
5. To balance rural development and urban growth
6. To raise public consciousness about conservation
7. To ensure the sustainable utilization of ecosystems
8. To manage non-renewable resources for long-term benefit
9. To establish population and immigration policies based on basic resource constraints for an acceptable standard of living

B. Sectors:

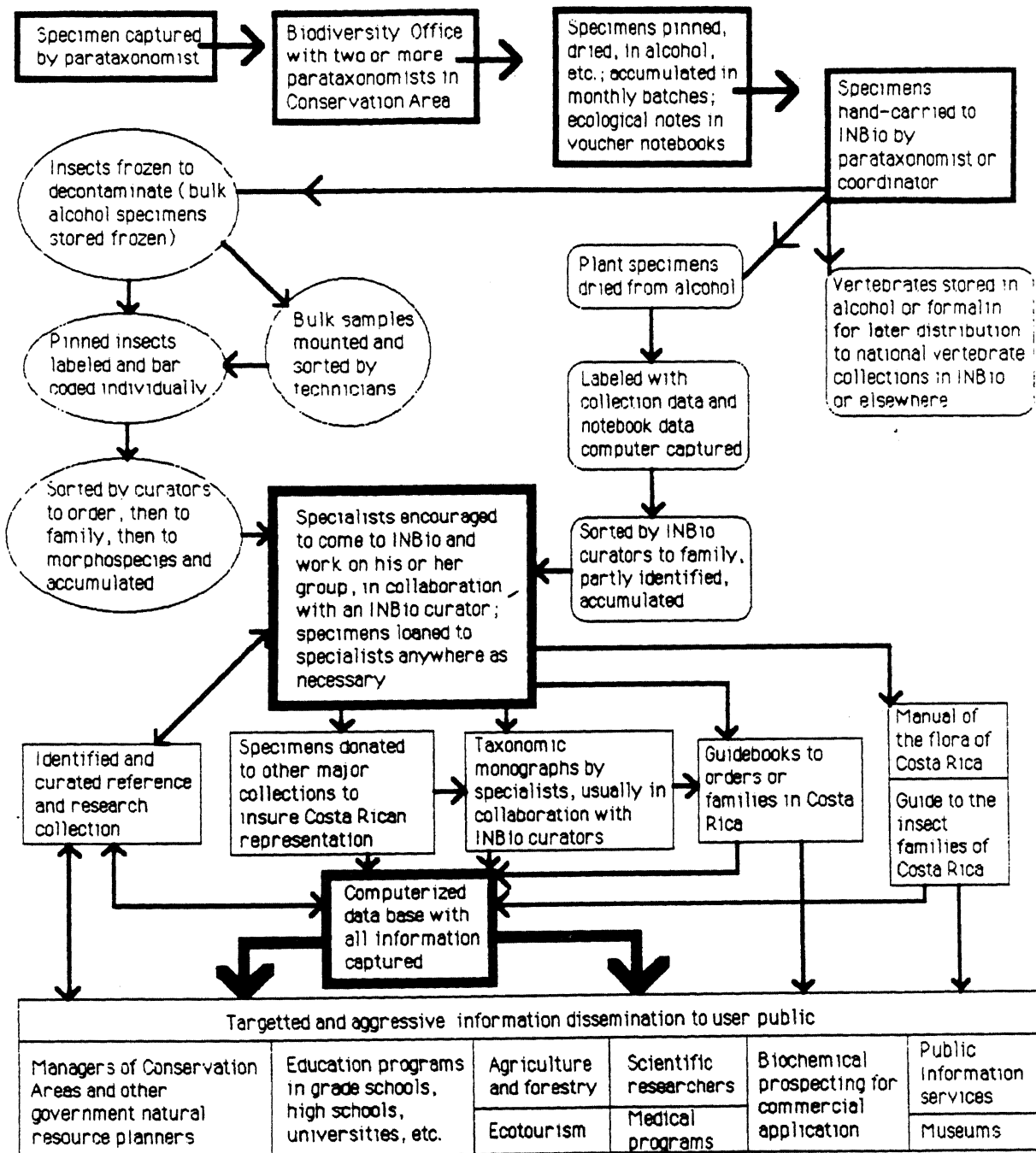
- | | |
|----------------------|-----------------------------|
| 1. Agriculture | 7. Urban planning |
| 2. Water Resources | 8. Education, Research |
| 3. Energy, Industry | 9. National heritage issues |
| 4. Pollution, Health | 10. Fishing, Coastal zones |
| 5. Demography | 11. Mining |
| 6. Legislation | 12. Forestry, Wildlands |

(source: Calvo, 1990:356)

APPENDIX 2

National Biodiversity Institute of Costa Rica (INBio)

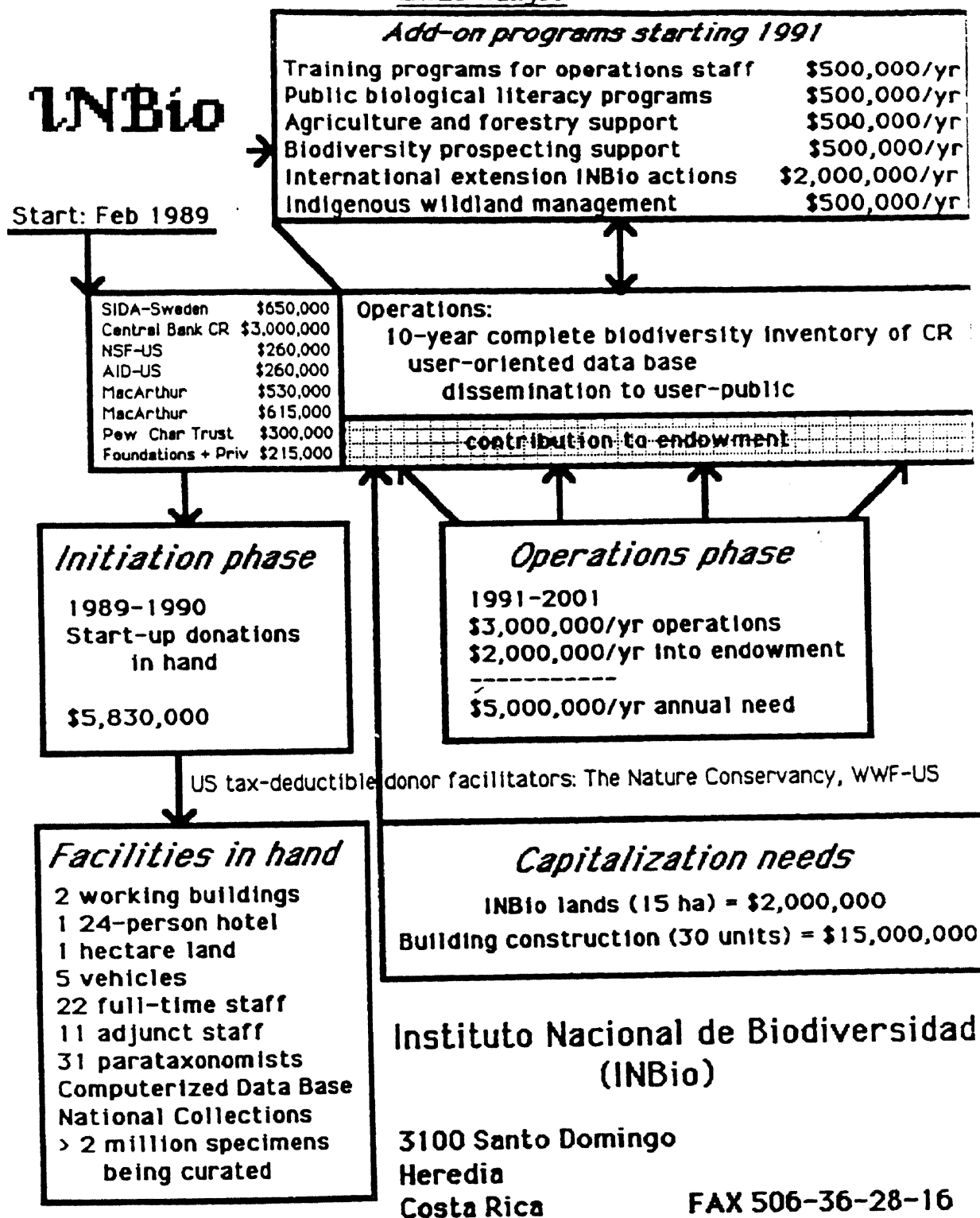
Inventory flow from field to public use



(source: INBio office, Santo Domingo, Costa Rica)

APPENDIX 3

INBio Budget



(source: INBio office, Santo Domingo, Costa Rica)

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INTERVIEWS

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Carazo Odio, Rodrigo - (president of the Republic of Costa Rica, 1978-1982) in Escazú, CR; Jun. 29, 1992

Koepsel, Kirk - (former Peace Corps volunteer working with ASCONA in Costa Rica, 1981-1983, current associate representative of the Sierra Club Northern Plains Regional Office in Sheridan, WY) by telephone; Aug. 13, 1992

Morris, Argentina Molina - (former personal secretary to President Rodrigo Carazo) in Chicago, IL; Feb. 29, 1992

Morris, Fred - (former director of Mesoamérica and the Center for Central American Studies, San José, CR) in Chicago, IL; Feb. 29, 1992

Olsen de Figueres, Karen - (congressperson in Costa Rican Legislative Assembly, First Lady of President José Figueres, 1970-1974) in Curridabat, CR; Jun. 29, 1992

Ulgalde, Álvaro - (director of the Costa Rican National Park Service) in San José, CR; Jun. 25, 1992

Ulloa, Eric - (assistant to the director of the Costa Rican Ministry of Natural Resources, Energy, and Mines) in San José, CR; Jun. 25, 1992